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THE IRON AGE

Contents

March 7, 1940

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Welded STEEL Machine BASES

. . . Produced by Skilled Craftsmen Unexcelled in the Art

Welded Steel Machine Frames and Bases are not only smoother in appearance but can be produced with greater accuracy and with less bulk and weight than castings of like dimensions. That is why so many alert machine manufacturers are today turning to welded steel construction. The R. C. Mahon Company is now producing welded steel frames and bases for many of the leading machine manufacturers throughout the country . . . highly skilled craftsmen, and an ultra modern, elaborately equipped plate shop make available to you a new standard of quality workmanship in this field. If you demand machine bases of exceptionally fine finished appearance and accuracy—bases upon which you will be proud to place your company's name, send your blue prints to Mahon for quotations.

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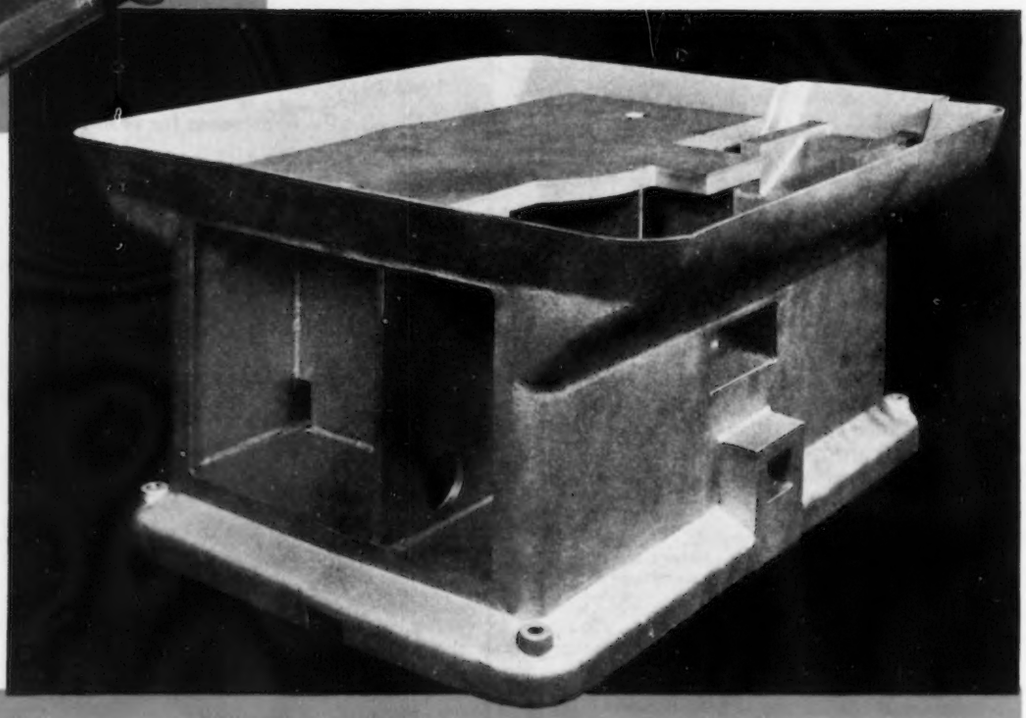


At the right is reproduced an unretouched photograph of a Welded Steel Machine Base produced by Mahon for H. R. Krueger & Co., Detroit, Michigan. Above is illustrated the completed Krueger Feedex Power Indexing Machine for which the base was built.

MAHON

▲▲▲ THE IRON AGE ▲▲▲

MARCH 7, 1940

ESTABLISHED 1855 Vol. 145, No. 10

"Information, Please!"

THE other day I had the pleasure of meeting a comparatively young man who was the recipient of a Carnegie Medal. And that, by the way, is quite a distinction, because these medals are not handed out indiscriminately.

This particular hero had plunged into the waters off Rockaway Point to rescue two non-swimmers whose boat had sunk under them. He brought them a quarter mile to shore and safety, one in each arm.

For this voluntary and heroic piece of work, our friend received a Carnegie Medal and $1000 in cash. All of which would seem to indicate that society puts a certain minimum value on human life, in this case, $500 per unit.

Now we have become accustomed, in industry, to accept this principle that life and limb are worth saving, even at the expenditure of considerable money. Witness the safety devices which all modern industrial concerns adopt to prevent accidents. I imagine if an accounting were made of their cost, it would probably aggregate at least $500 investment per employee. For safety alone.

Of course, it is impossible to arrive at any financial evaluation of an American life, in terms of its value to the state or community. But we can say that one of them is considered to be worth at least $500, on the basis of the market value established above. A minimum, of course.

Contrast this evaluation of what it is worth to conserve life in peace time, if you please, with what is paid to take life in war time.

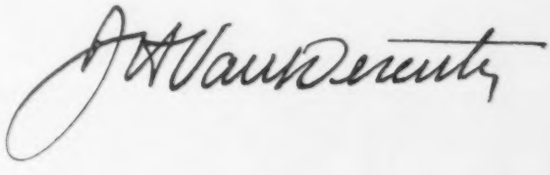
The World War cost the United States $40 billions in round figures, according to Treasury Department figures. That meant a cost of $317,000 for each American casualty. Expensive business, any way you want to look at it!

Maybe it cost less, in the last war, to kill Englishmen or Frenchmen or Germans than it did to kill Americans. I don't know.

But there does seem to be a large discrepancy between society's appraisal of a value of $500 on a life saved and its appraisal of a value of several hundred thousand dollars as an investment in taking one.

Maybe that is what makes war so expensive.

Can someone answer this question? For if a dead man is worth five or six hundred times as much as a live one, why have Carnegie Medals or safety devices in industry?



FRENCH INDUSTRY ADOPTS LEDLOY!

New Inland lead-bearing, open hearth steel

Factories in France are humming today at top speed—to feed the guns—to win the war. That is why this advertisement appears in a leading French industrial paper. French factories, and English factories too, are finding what many American manufacturers have already learned—Inland Ledloy bars and plates help speed production. Work goes, in the words of the Frenchman, *á trés grande vitesse.*

This remarkable new Inland development—a lead-bearing, free-cutting steel—greatly increases production while retaining all the desirable qualities of good open hearth steel. Ledloy is made in all open hearth carbon steel analyses. Cutting speeds are increased 30 to 60%—tool life, 50 to 200%. Actual savings, available for increased profits, are often as high as $50.00 or more per ton of steel machined.

You should be familiar with the possibilities of this important new machining steel. We suggest that you call or write for Inland Ledloy Bulletin No. 50.

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Process Control of SPOT WELDING

o o o

By C. L. HIBERT
Consolidated Aircraft Corp., San Diego, Cal.

o o o

SPOTWELDING equipment meets its most severe test in aircraft manufacture. What the requirements are, the welding variables, time of current dwell, diameter and shape of electrodes, pressure on electrodes, contact resistance, and current density are all covered herein.

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SPOTWELDING is gradually emerging from its experimental role to a production process in aircraft manufacture, with the shift from unstressed parts to primary structures. Of course, the change has been slow as "caution" is the keynote of the industry. When spotwelding was first introduced, it was believed that this method of joining metals would revolutionize the industry. This has not taken place because, relatively speaking, changes in aircraft construction are gradual.

Those who remember the wood and fabric days realize the shift to welded tubular construction did not take place overnight. The same was true when the welded tube design was replaced by the all metal stressed-skin airplane. Yet vestiges of former designs can still be found in the present models. Fabric is still used on some surfaces, engine mounts are of welded tubular construction, and many other similar examples could be cited by those familiar with aviation.

The same is true of aircraft processes—one process does not entirely displace another, nor do departments die out. Although many new processes have come into existence, the aircraft factory still has the fabric, welding, and wood shop. Spotwelding will make inroads on riveting, and other forms of welding, but likely will never completely replace either.

At present the spotwelding department in airplane shops consists of a few machines, and the work is diversified as to character and materials. Templates and jigs are made of galvanized sheet, mild steel, and chromium-molybdenum steel. The materials used for regular production consist of aluminum alloys, magnesium alloys, stainless steel, and chromium-molybdenum steel. All of these materials require different treatment, and therefore it will be necessary to restrict this article to generalities, with special notations applying to the various materials.

Satisfactory spotwelding is dependent on the accuracy of the control of the welding variables and the amount of care used in the control of the process. These points are divided into groups and will be covered by this article under their respective headings.

Welding Control

(1) Time of current dwell.
(2) Electrodes.
(3) Pressure on electrodes.
(4) Contact resistance.
(5) Current intensity.

Process Control

(1) Equipment.
(2) Personnel.
(3) Design.
(4) Supervision.
(5) Inspection.

The foregoing divisions have been made with the object of outlining a satisfactory welding technique for aircraft production. Only if all factors are analyzed and understood will it be possible to gage their relative values and importance to produce the ideal repetition weld. A well organized control is essential to get results and not alibis, and the object of this article is to outline the type of control that is essential.

It is rather embarrassing to find an assembly completed with faulty welds, at which time it may be virtually impossible to rectify the faults because

ot anodizing or some other finish treatment.

Perhaps the biggest step in spotwelding practice was the development of the electronic control for current timing. The making and breaking of the heavy kva. necessary to weld the non-ferrous metals are rather difficult to achieve with a mechanical timing device. But, of course, for use with ferrous metals there are some excellent contactor timers on the market. Timing devices should not only control the length of time but the amount of current passed — for each weld should be uniform. The difficulty with most mechanical timers is that they do not cut the a.c. wave at the neutral axis—consequently a current variation is introduced. The d.c. welder is another story, for here the electronic principle cannot be applied and the amount of current should be rationed according to I^2t.

MYSTERY ship 31X of Consolidated aft C spotwelds. The cowling is enti elded steel, and the nacelle and dowl flaps of Alclad. trance door in the side are spotwelded, e pit furnishings are assembled is che

Time of Current Dwell

Spotwelding of stainless steel (18-8) without the addition of columbium or titanium requires a short period of time to prevent carbide precipitation and a deleterious effect on the corrosion resistant properties. Columbium or titanium is added to prevent intergranular corrosion and this variety of stainless is said to be stabilized. Tests indicate that changes in time have little effect on shear strength in lb. per sq. in., and on corrosion, provided the fused zone does not reach the surface of the sheet and the area of the weld is adequate.

For this reason, in the welding of stainless steel there is no necessity for using excessive time if the welding machine has adequate power. Neither is it necessary to use half cycles which will tend to build up a d.c. component on the welding transformer. Sufficient increments of current adjustment should be provided to enable a low current setting for the thinner gages. A length of current dwell between 1 and 6 cycles may be regarded as a practical limit. A constant setting within this range may be used for all gages of 18-8 sheet welded for aircraft work.

It has been believed that short periods of current timing are essential for welding aluminum alloys, to prevent the zone of fusion from reaching the exterior surface of the sheet. Further investigation has revealed this as not being necessary, and more uniform results may be obtained by using longer cycles, that is cycles in the neighborhood of 10 instead of ½ cycle and a maximum of 3. The welding of aluminum alloys differs from that of steel, since the former has a very short plastic range. That is, an actual slug must be cast in the aluminum-alloy sheet, whereas steel has a long plastic range and a spotweld may be compared with a blacksmith or forge weld.

For welding of steel other than the stainless alloys, a period of current dwell above 15 cycles appears to give better results, which may be due to the working of the weld by the electrodes while the weld is still plastic. Weldability decreases with the advancing carbon content of the steel. SAE (4130 and 4140) steels must be normalized after spotwelding, for the welds are brittle—due no doubt to the air-hardening characteristics of the steel and the quenching effect of the water cooled electrodes.

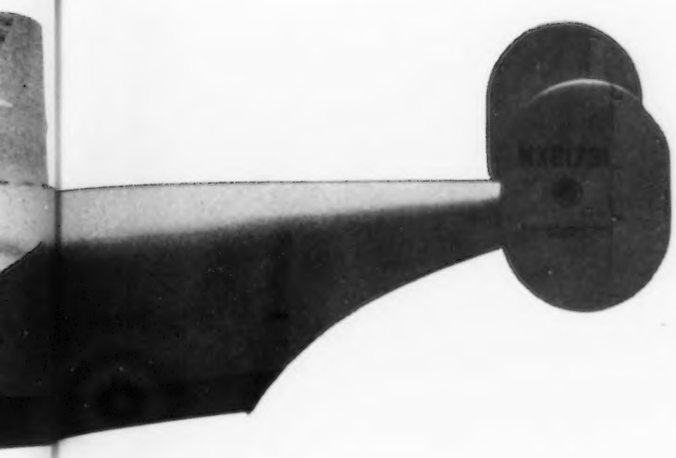
Shape of Electrodes

The diameter and the shape of the electrodes have always been a matter of experimentation. The electrodes represent the bottle-neck to the electrical system because of their necessarily small cross-section. The ampere-density is extremely high, and for this reason they should be water cooled to within a short distance of the welding end. Excessive pickup is in some cases caused by insufficient water cooling, and for any production welding it is mandatory that all tools and holders should provide for adequate cooling of the electrodes.

Copper has been used extensively as an electrode material because of its exceptionally good conductivity, but it is too soft for production welding of aircraft materials. Consistent results cannot be attained if the electrode material does not retain its shape under high welding pressures. Now, various copper alloys are on the market—they have good conductivity and are much harder than copper, and such alloys stand up well in service. They are sold under several trade names, with manufacturers' recommendations as to what materials can be welded by the various alloys. It might be mentioned that the search for a satisfactory electrode material for welding aluminum alloys still goes on. The difficulty with copper alloy electrodes is that they tend to alloy with the aluminum, the result being pickup and necessity for frequent cleaning.

Shape and design of tips may vary with the metals that are to be welded. In the case of stainless steel, where less current is used, it is not necessary to have a large diameter tip. It is also possible to sacrifice conductivity of the electrode material for higher hardness. Alloys for electrode material are rather expensive and therefore the practice is to insert a ¼-in. diameter rod about ¼ in. flush into a ⅜-in. copper electrode. A press fit rather than silver solder is used to hold the insert in place. For, heating will cause some of these alloys to sweat. For aluminum alloy welding the electrode material is not expensive, and the tip is made entirely of one piece.

Electrode tips should be so designed that they are standard and interchangeable with any of the holders, and this also applies to holders as well, as they should be interchangeable with



dated aft Corp. contains many thousands of is entelded, the nose ring is of 18-8 stainless ips of Alclad. The beaching gear door and en-elded, he pitot mast and practically all of the emble his cheap production method.

all spotweld machines. A little thought in this direction will eliminate considerable production cost. Sufficient tips should be provided for frequent changes, and these can be stored in a wood tray drilled to receive the shank. The ideal electrode tip would have a spherical end, but this shape is difficult to maintain. Therefore, a 3-deg. cone is used for steels, and from 7 to 11 deg. for welding aluminum alloys. In setting up the electrodes, the conical tips must line up perfectly for best results, and several test welds should be made to develop the electrode to the proper contour. Tips should be cleaned with fine sandpaper, but never with a file. Clamping a weed block wrapped with No. 7-0 sandpaper, or similar device, between the tips makes an effective cleaning tool, that will not abrade the electrodes excessively. Cleaning of tips varies with the material being welded—for steels very little cleaning is necessary, whereas with aluminum alloys the tips must be cleaned after every 7 to 10 welds.

At times flat tips are used. Such tips eliminate a deep depression in the work but necessitate higher electrode pressures. With the flat tip the tendency to splash between the sheets is eliminated and results are better as regards porosity. A flat tip is more difficult to control, and more experience is required for satisfactory results. Any errors of welding technique are magnified when using one or two flat tips.

Improper care of electrodes causes more grief and poorer results than any other single factor in spotwelding. Work must be held at a right-angle to the tips for best results, and any skewness distributes the effective current over a greater area, making for poor welds. Frequent test samples should be made during production as a check on electrode conditions and character of the welds. After the tips are badly worn they should be returned to the tool room for redressing. Furthermore, tips should be changed when the machine setting is changed for a different gage of metal.

There are four requirements for a satisfactory electrode material, and any new material considered should meet these:

(1) Must be harder than the material welded.
(2) Will not alloy with the work.
(3) High melting point.
(4) Conductivity higher than the material welded.

Pressure on Electrodes

Electrode pressure is not as critical as the other welding variables. It may be varied over a fairly wide range, but when one pressure has been selected for the work in progress it must remain constant. An increase in electrode pressure results in a lowered contact resistance between the sheets and consequently less heat is developed. Therefore, with higher pressures more current must be used to develop a satisfactory weld. Too high a pressure necessitates very large welding currents with a tendency toward shallow welds, whereas too low electrode pressure results in porous welds and danger of the current arcing between the work, causing a blowhole. Low welding pressures will cause excessive pickup on the electrodes and pinholes in the center of the weld.

Air pressure dial readings should be calibrated to read electrode pressure in lb., instead of the usual reading of lb. per sq. in. air pressure. If this is done some idea is gained of where to start with machine settings—for with five variables to control it would be better to use recommended settings for four variables and leave but one for adjustment, namely current. Table I gives recommended settings for various aircraft materials.

All spotwelding equipment, including portable tools, should be air or hydraulically operated. Manual or spring operated pressure tools should never be used where consistent spotwelding is desired.

Contact Resistance

The amount of heat generated when spotwelding is expressed by the formula:

$H = I^2Rt$

where H equals Joule of heat.
I equals current in amperes.
t equals time the current flows.

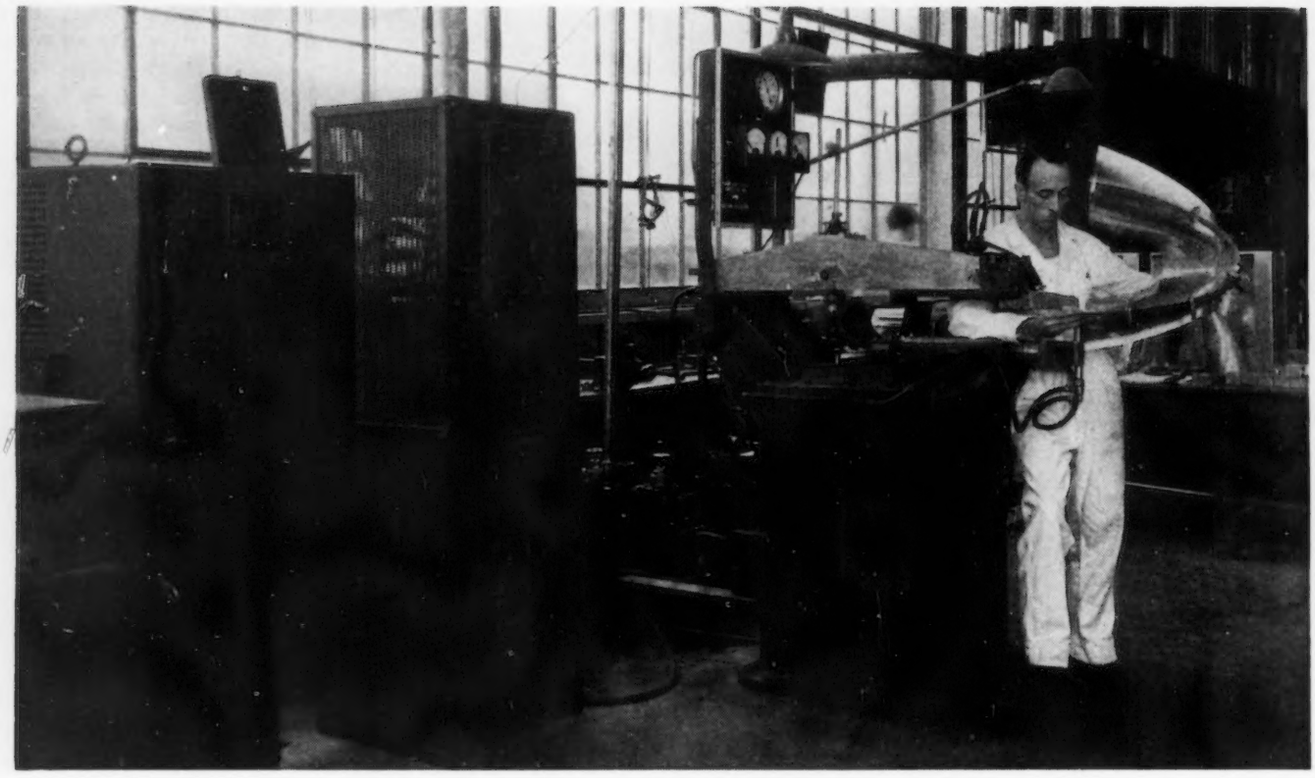
R consists of the sum of three resistances:

r_1 = contact resistance between the electrode and sheet.
r_2 = specific resistance of the material welded.
r_3 = resistance between the two sheets welded.

It can be seen from these factors that the resistance depends first upon the specific resistance of the material, second, on the condition of the surface, and third, on the pressure used. If the resistance of the material is relatively high, as is the case with stainless steel, a small kva. is required for welding. For aluminum alloys, where the resistance approaches that of copper, high amperages are necessary.

The condition of the surface is very important, and has been a neglected factor for some time. For best results nothing but absolutely clean material should be welded, and by this is meant a surface that will support a film of water. It has been found that operators touching cleaned aluminum alloy material with dirty fingers will lower test results. The same is true of the steels perhaps to a lesser degree.

Some materials such as aluminum alloys have a naturally acquired oxide



TYPICAL equipment for aircraft spotwelding. This view shows the electronic control cabinet; sequence panel and auto-transformer are contained in the second cabinet from the right, and the instrument panel is on the welding machine. More recently developed equipment has phase angle shift included in the electronic control, which eliminates the auto-transformer steps for current adjustment.

TABLE I

Recommended Welding Data for Various Aircraft Materials

Thickness, in.	Shear Strength, lb.			Design, lb. Shear			Electrode Pressure			Time of Current Dwell		
	18-8 Stainless	24ST Alclad	52 SO	18-8 Stainless	24ST Alclad	52 SO	18-8 Stainless	24ST Alclad	52 SO	18-8 Stainless	24ST Alclad	52 SO
0.005	150	...	...	100	...	...	100	...	...	Keep time below 0.1 sec. or 6 cycles	0.1 sec. to 1/6 sec. 6 cycles to 10 cycles	0.1 sec. to 1/6 sec., 6 cycles to 10 cycles
0.010	300	...	...	200	...	...	125	...	...			
0.015	500	100	95	330	65	30	150	...	...			
0.020	720	140	130	480	90	85	175	200	200			
0.025	950	190	180	630	125	120	200	250	250			
0.030	1200	240	220	800	160	145	225	300	300			
0.035	1430	300	260	950	200	170	250	350	350			
0.040	1700	350	300	1130	230	200	275	400	400			
0.045	2000	410	340	1330	270	225	300	450	450			
0.050	2350	470	380	1580	310	250	325	500	500			
0.055	2750	540	420	1830	360	280	350	555	555			
0.060	3280	610	460	2190	410	305	375	600	600			
0.065	4000	690	500	2670	460	330	400	650	650			
0.070	5200	780	540	3470	520	360	425	700	700			

NOTES: (1) It is understood sheet thickness means the thickness of the thinnest gage welded. When a heavy sheet is welded to light gage, use values for the light gage.
(2) Pressures given in the table are the minimum values to be used.
(3) For current use a high enough setting to develop welds that will average above the minimum shear strength as given by the table.
(4) Time in cycles is based on 60 cycle current.

coating of high resistance. At first this would seem to result in better welds with less current. Nevertheless the oxide coating has been found to be detrimental to weld strength and should be removed by physical or chemical means. A 5 per cent nitric 10 per cent hydrofluoric (remainder water) wash makes a good cleaning solution for removing the oxide coating from aluminum alloys. This can be contained in a lead lined tank, and parts should be rinsed off thoroughly with running water after a 30-sec. dip in the acid solution. The parts should then be dried and welded as soon as is practicable. Paint, oil and grease must be removed prior to the nitric-hydrofluoric acid etch.

Aluminum alloys that do not contain copper as an alloying agent need only be etched on the exterior surface. These alloys have such a low specific resistance that it is difficult to effect a weld or insure satisfactory results if the contact resistance is lowered further by removing the coating from the contact side. Of course it is necessary that such contact surfaces be cleaned of extraneous material.

Steel parts that are scaled must be pickled or sandblasted before welding. Here again much effort is wasted in any attempt to weld dirty stock. A small amount of time required for cleaning is more than offset in time

saved in electrode maintenance and in correcting poor welds. Of course with materials free of oxide coatings, like stainless steel, it is only essential that they be cleaned free of grease dirt, or paint. This can be done by using one of the many commercial solvents.

Wherever possible torch welds should be made after spot welding, for the presence of flux or extraneous material between a joint will cause spongy spot welds having little strength.

Current Intensity

Current intensity required to weld the gages of aluminum alloys required in aircraft is supposedly in the neighborhood of 5000 to 30,000 amp., and 1000 to 5000 amp. for 18-8 stainless steel. Although secondary current cannot be measured directly, it is assumed to be a product of the primary current and turn ratio. The effective current available at the electrodes is a matter of conjecture because of the variable reactance introduced by changes in tool set-ups and machine arm positions. An efficiently designed machine may be rated at only a few kva. and accomplish spotwelding of as heavy gage of similar material as a machine rated at a much higher kva. In other words, kva. ratings are a function of throat dimensions, power factor, and efficiency, and mean nothing as far as ability to spotweld.

For the reasons just mentioned, any attempt to correlate amperage to weld various gages of materials would be futile. The proper procedure is to use recommended settings for the other welding variables and maintain these constant, then adjust current from a low setting until the optimum weld is obtained, as indicated by shearing or tearing tests. Most work spotwelded for aircraft are unstressed parts, and a weld that will pull a slug when rolled apart may be considered satisfactory.

Current settings will vary from day to day, due to line fluctuations, differences in tool set-ups, and other factors beyond the control of the operator. Therefore, test samples should be made for every change in welding conditions, instead of relying on previous settings.

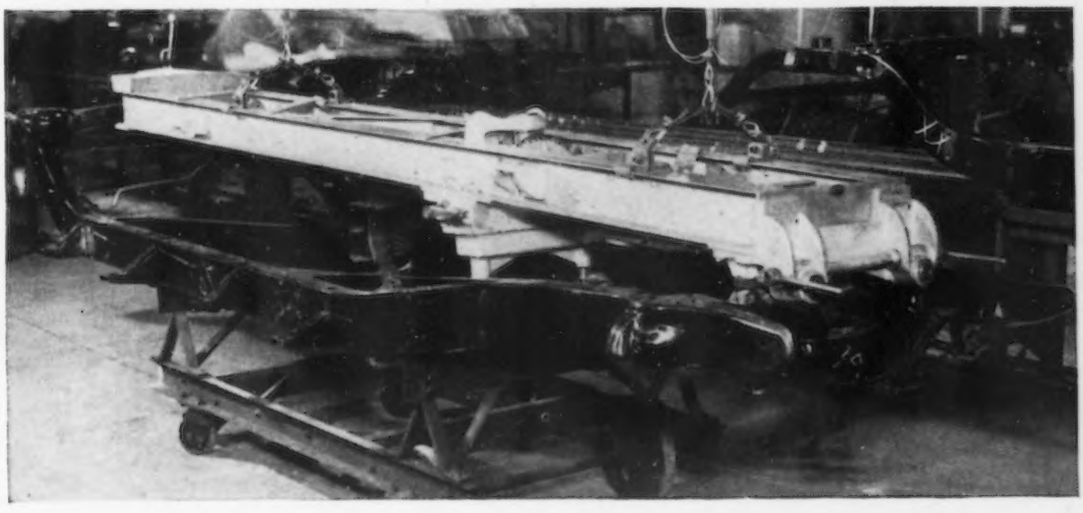
Ed. Note:—Next week the author concludes this report with data on design of spotwelded parts, equipment used, personnel and inspection of welds.

Large Assembly Jig of Magnesium Alloy

ONE of the most elaborate jigs ever used for assembly line accuracy on an automobile chassis probably is the one used to locate the power plant in the frame of the 1940 Buick. The fixture is used to line up the center line of the crankshaft with the propeller shaft, thereby assuring that the drive is directly through the lateral center line of the car. The procedure also includes a means of checking to determine accurately that the rear engine mountings are of equal height or not with respect to the front engine mounts to which the engine is first bolted. If the rear mountings are not properly leveled, undue strain is placed on both engine and frame. The jig gives the means of locating the error and making the correction.

This special rear engine-mounting locating fixture is made of extruded and cast Magalloy (magnesium alloy) and was produced by Magnesium Fabricators, Inc., Adrian, Mich. Magalloy was selected because it provides the proper amount of rigidity essential in an operation of this kind while at the same time giving extreme lightness. The material weighs only two-thirds as much as aluminum and approximately one-fifth as much as steel. Because of its size, the fixture must be light in weight to facilitate handling. Another quality which fitted the material to this use is that it has high abrasion resistance.

In use, the locating fixture is placed over the frame (see accompanying illustration), being located at the front by the engine bolt holes in the front engine mountings and at the rear by a gage hole in the center of the crossmember at the kick-up. Plug gages are then lowered into the tapped holes in the top of the rear engine mountings. When the plug shoulders are fully seated, the mountings are correctly placed and are then tightened in position. By means of appropriate linkage, the amount that one mounting is lower than the other is indicated on a large dial observable from the top of the fixture. The dial is graduated to show the number of spacers to be inserted between the engine and the mounting on the indicated low side.



Molding Sand...

By W. A. PHAIR
Associate Editor, The Iron Age

o o o

"ONE of the most important items in the production of iron castings is the material used in making properly shaped containers to hold the molten iron until set." That statement made a quarter of a century ago by the late Dr. Richard Moldenke, is especially appropriate today when foundrymen are expected to produce castings with all the attributes of a rubber band, the Maginot Line and Ann Sheridan—and all at a price competitive with second-hand newspapers.

Foundry technologists throughout the world have given this container problem very serious study over the past decade and many reforms have resulted from these efforts. One manifestation of these studies is the development of the Randupson[1] process of molding with cement bonded silica sand. The metallurgical and economic aspects of this molding method have been discussed previously[2] at considerable length, but little attention has been devoted to the practical sand

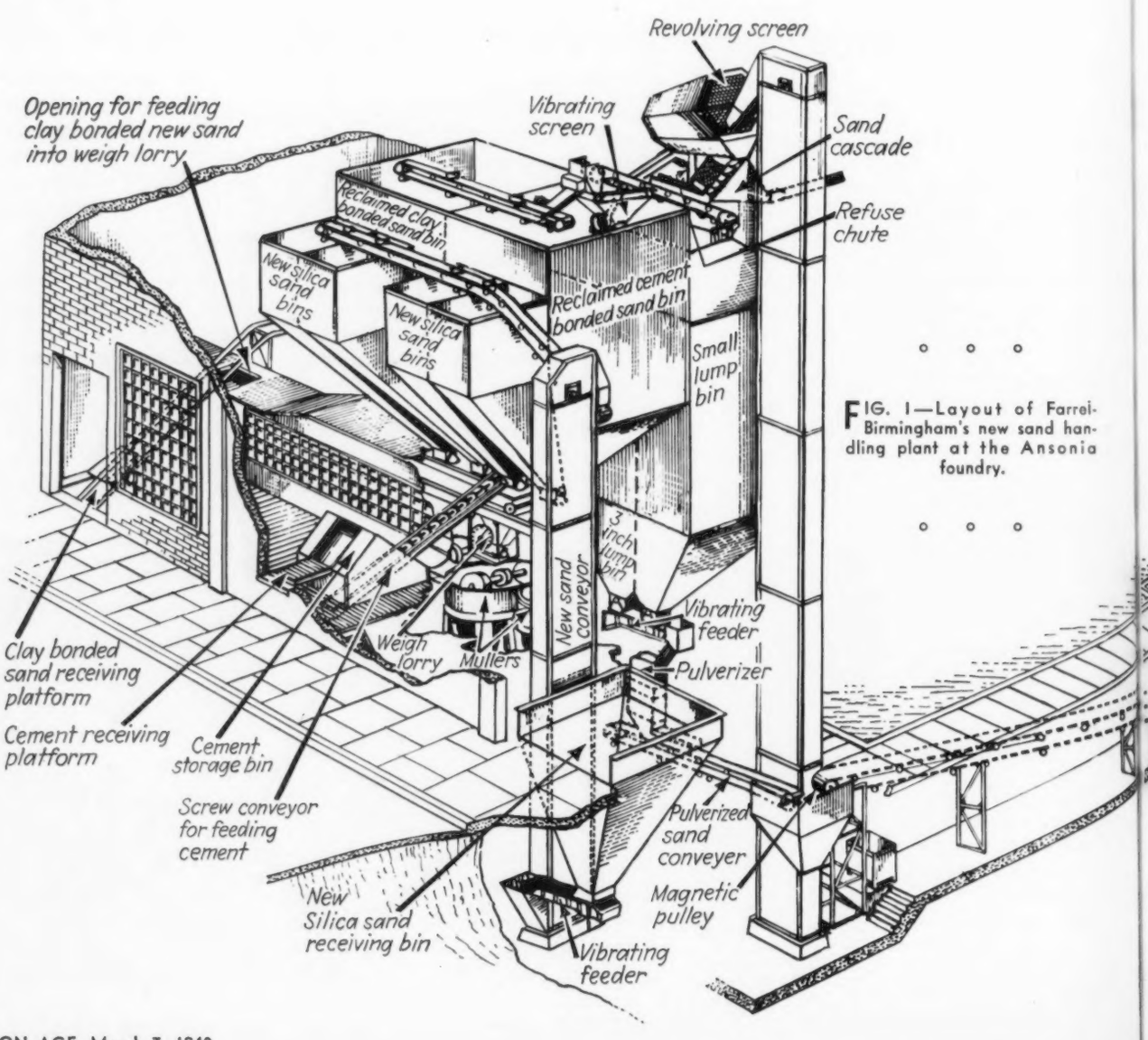


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FIG. 1—Layout of Farrel-Birmingham's new sand handling plant at the Ansonia foundry.

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This automatic system reclaims both clay and cement bonded sand. Grain distribution control is particularly effective.

problems involved in conditioning sand for use with this method.

In the early days of the process, the spent sand, which, after removal from the casting, is partly in lump form and partly in the form of very fine particles, was either crushed to some degree and used as backing material or core vents, or simply thrown away. Very little effort was made to reclaim it.

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FIG. 2—This sand cascade, located immediately below the revolving screen in unit shown in Fig. 1, is an innovation in sand dedusting apparatus. The sand stream, bouncing from louver to louver, is exposed to an air stream which effectively removes the fine particles and acts to cool the sand.

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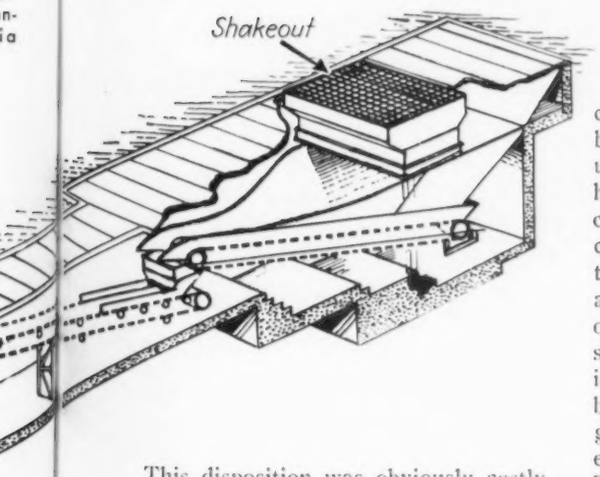
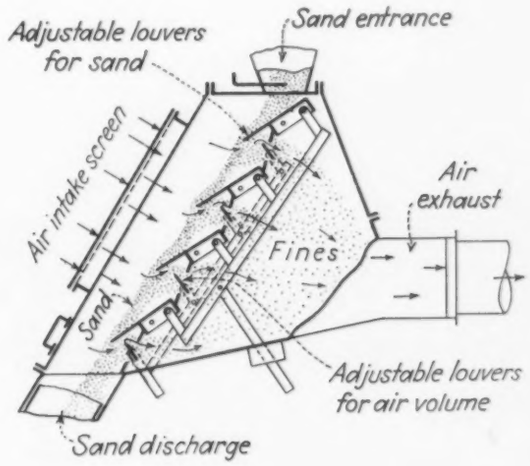


This disposition was obviously costly and inefficient, as the refractory value of the sand grains is not seriously affected by use.

However, as users become more familiar with the process, there have been significant strides in the direction of reclaiming the sand. A noteworthy illustration of this trend is the new sand reclaiming plant (in this article, reclaiming will be taken to cover the reclamation, mixing and tempering of the sand) at the Ansonia, Conn., foundry of Farrel-Birmingham Co., Inc. (Fig. 1.)

This sand unit is unique in that it is the first reclaiming system built



capable of handling both cement bonded and clay bonded sand. The unit also embodies many features not heretofore incorporated into sand reclaiming systems, notably the sand cascade shown in Fig. 2. The output of this plant is large and varied and of a nature that requires a high degree of finishing combined with good strength. Typical products turned out in the foundry include machine tool beds and frames, engine cylinders, gears, turbine casings, transmission equipment parts, rolls, presses, etc. The company started using the Randupson process experimentally in November, 1937, and went into full production in March, 1939. Some jobs are still put up in the orthodox dry sand and green sand methods, the choice dictated by existing pattern equipment, the design of the casting, and time needed to mold. This time element, incidentally, is perhaps the chief limitation of the cement process. At the maximum, prepared cement sand can stand for about 2½ to 3 hr. before dehydration has advanced to the point where the sand is unfit for use. The Farrel foundry has set 70 min. as the maximum time the sand may stand before using, a limit that provides an ample safety factor.

Previously it was the practice at the Ansonia foundry to discard the used sand, saving only a small portion for backing and core venting material. The new sand unit reclaims practically all the silica content of the sand, purposely weeding out the fines which are finally disposed of in the form of a sludge.

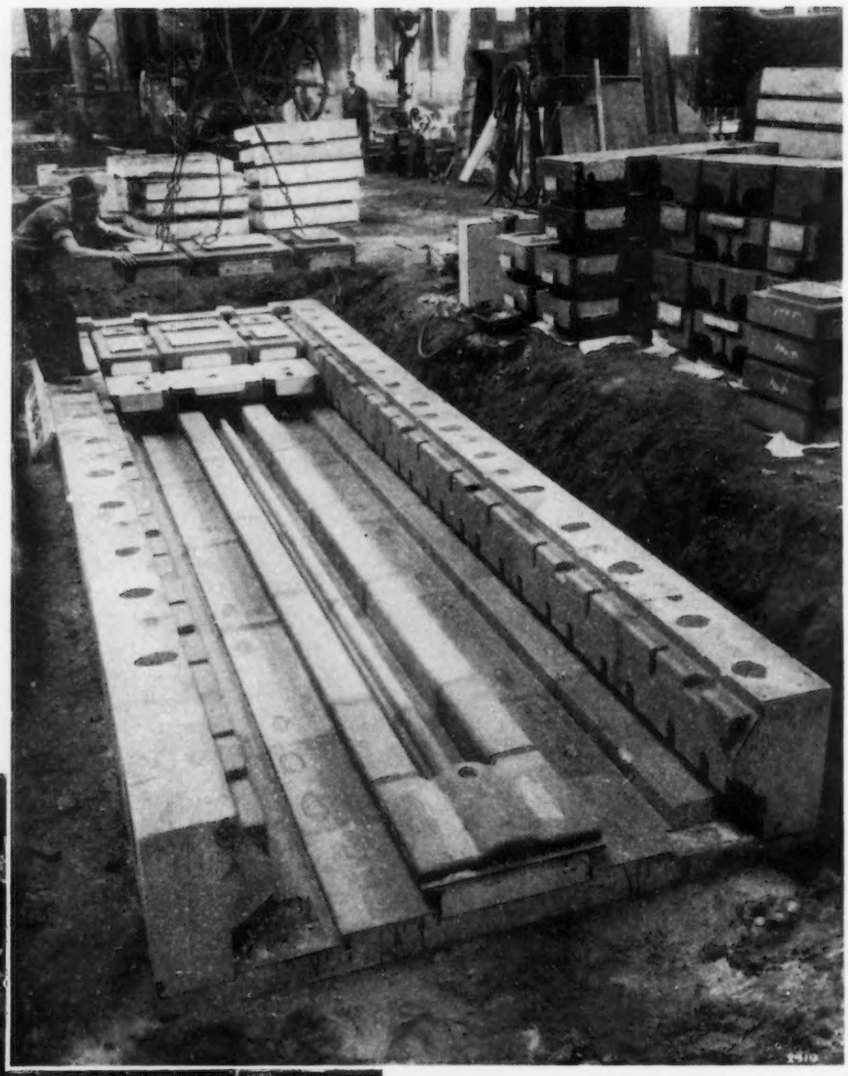
Before venturing into a description of the new sand unit, it would be well to record some of the more interesting experiences of the company since the introduction of the Randupson process. The use of cement sand is not a proposition that effects only the molding department. To the contrary, its ramifications extended through every phase of the plant, even touching upon employee relations. Cleaning operations on large castings are substantially simplified by the manner in which the sand peels from the castings. In many cases the finish of the larger castings after shakeout is such as to require little further attention. Absence of gas forming elements in the mold clears up many of the small gas scars which too often plague the large casting surface. The Randupson product is surprisingly free of skin blemishes. The strength of cement molds minimizes warping and consequently lowers machining allowances. Unmachined castings show excellent trueness, as in the sidewalls of the way channels on the 30-ft. grinder bed shown in Fig. 3. (On a casting of this size, the reduction in machining allowances has significant economic reactions). The dimensional accuracy of the castings turned out in cement

molds appears to be superior to usual dry sand practice.

Of course, cement molds are not cure-alls, and while they do ameliorate some of the usual headaches, they give rise to others. From first-hand observation it would appear that gray hairs are just as common in a plant using the cement process as in one using the commoner methods of molding.

Less Dust Created

While it is true that in most cases, the rectilinearity of cement molded castings is something to rejoice in, there are still enough wayward castings to require constant surveillance of all operations. Yet, judging from the experience of this particular plant, the cement process does offer considerations that not only improve the caliber of the castings turned out, but also offer opportunities for improved shop costs. The reduction in dust creation, a particularly vital concomitant of the Randupson process, not only offers a psychological benefit to the plant personnel but also has tangible effects upon insurance premiums.



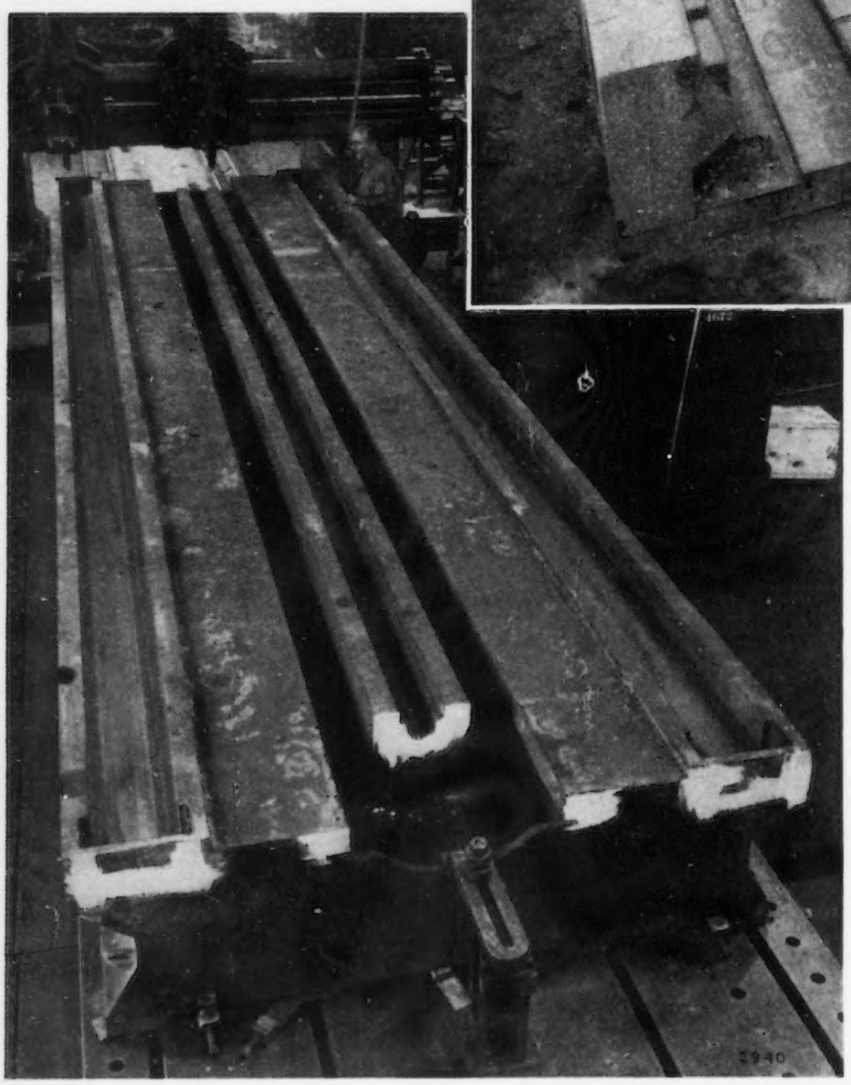


FIG. 3—The use of the cement sand process makes possible the molding of this roll grinder bed on a strictly production basis. Sections such as can be seen on the crane hook are rapidly produced on a molding machine in standardized core boxes.

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Large Bed Molding Simplified

An example of the improvement in production practice brought about by the cement process in the Farrel foundry is its ability to produce the component parts of the roll grinder bed shown in Fig. 3 on a bumping, open end, roll-over molding machine, thus converting a strictly jobbing proposition into a production item. The machine used, specially designed by Tabor and built by Farrel-Birmingham, has a plate 66 x 88 in. and ac-

commodates two sizes of standardized core plates. The various sections of the mold, such as is seen on the crane hook in Fig. 3, are rammed up on this machine, transferred to a roller conveyor for finishing, and then stored for curing. The curing, as is common practice in cement molding, takes 72 hours.

This machine is operated with a crew of four men — two ram, one finishes and one supplies the rods.

Any attempt to appraise the value of the cement sand process in producing the types of castings made at the Ansonia foundry is confused somewhat by the fact that the foundry casts Meehanite metal. There is some degree of overlapping in the advantages accruing from the use of both the Randupson and Meehanite processes and it would be difficult to ascribe any specific characteristic of the final product to either one or the other process. In the final analysis, production cost and service performance are the practical criteria of the value of the two methods. Judging from those two standards, it appears that the combination is indeed a happy one, for each process has the facility of extracting from the other the fullest measure of its capabilities.

One consideration in constructing this particular conditioning plant, which is not always met in engineering such units, is that the time limit imposed by the quick setting of the mixed sand renders it not feasible to prepare the sand more than an hour in advance of its actual use. The mixing of the sand batches must be geared closely to their actual use. So important is this feature that experiments are being conducted using both telephone and telautographic communication between molding floor and the mixing platform to facilitate the synchronization of the mixing and molding operations.

A schematic sketch of the new conditioning unit is shown in Fig. 1. Considerable liberty has been taken with the actual dimensions of this unit for the sake of clarity.

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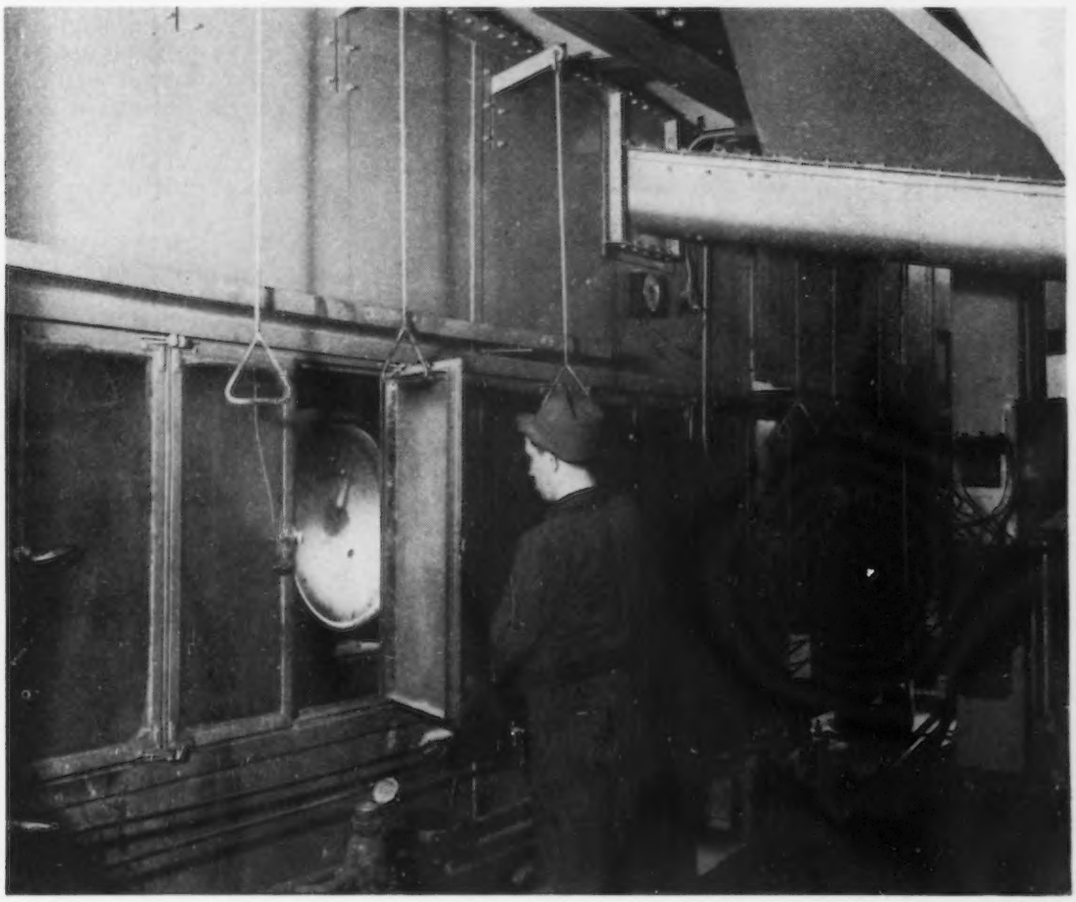

FIG. 4—Batch preparation platform. The long rod on which the operator's hand rests controls the movement of the weigh lorry from bin to bin, while the levers hanging overhead control the bin gates. Cement conveyor housing can be seen at right center.

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Other castings are also made on this machine, but this roll grinder bed is perhaps an outstanding example of one phase of the economics involved in cement molding. A smaller machine is also in use, having a 30 x 40 in. plate. The sand is delivered to the large machine from the mixer in sand boxes carried by automatic electric trucks. The sand container is raised and attached to jib cranes on either side of the machine and is swung over the core box and discharged by opening a gate in the container. Lumps for backing are stored in a bin in front of machine and when needed are lifted by a vertical conveyor to a swivel chute, and directed into the core box.

This unique unit can handle both clay bonded and cement bonded sand with only minor adjustments to the system. Used sand enters the system through the shakeout, which passes all material up to 3-in. lumps — larger chunks must be broken down to a 3-in. size. From the shakeout, the sand progresses over an underground conveyor, over a magnetic pulley which removes tramp iron, etc., discharges into a vertical boot conveyor, and is carried to the top of the system. The sand then runs into a revolving screen where three distinct separations are effected—1 to 3-in. lumps, 20 mesh to 1 in. material, and sand below the 20 sieve. The 3-in. and 1-in. lumps are passed into their respective

bins, while the finer material bumps over the sand cascade, onto a conveyor, over a vibrating screen and into the reclaimed sand bin. When handling clay bonded sand, the vibrating screen is by-passed and the sand is moved into the reclaimed clay bonded sand bin by means of suitable belt conveyors. At the bottom of the lump hoppers are a series of gates and a vibrating feeder which permits either drawing the lumps off for backing or venting purposes, or passing them through the pulverizer which reduces them to approximately 20-mesh size. The operater has the option of drawing off either 3-in. or 1-in. lumps.

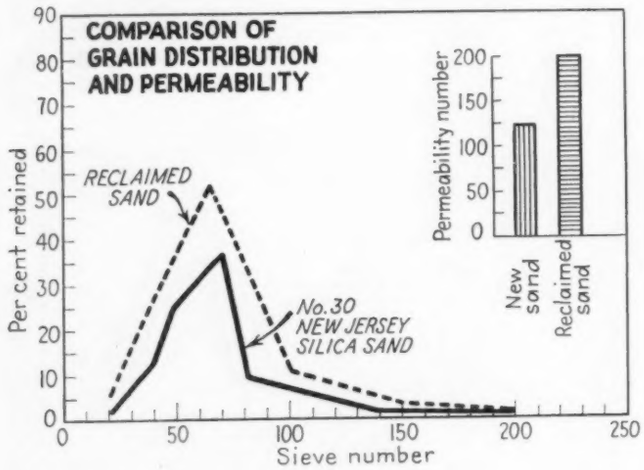

FIG. 5—A comparison of grain distribution and permeability of a typical car of new silica sand and a batch of reclaimed sand.

From the pulverizer, the sand is carried back into the vertical elevator and up again to the revolving screen. New silica sand is unloaded at the receiving bin and is conveyed by belts to the four storage bins. Cement enters the system at the cement receiving platform and is dumped into a storage bin and fed to the batches by a screw conveyor. New clay bonded sand enters at a receiving platform at the corner of the building and by means of a skip is moved into position over the weigh lorry tunnel and dropped into the lorry. The entire system is operated under a slightly negative pressure.

The handling system was installed by Link-Belt Co., and all equipment except the following was manufactured by Link-Belt: two National Engineering intensive mullers, two Jeffery vibrating feeders, a Simplicity shakeout, a Stedman pulverizer, a magnetic pulley made by Magnetic Mfg. Co. and a Fairbanks scale. One No. 24 and one No. 36, Type W, American Air Filter Roto-Clones are utilized for dust collection.

One noteworthy section of the unit is the weighing arrangement. As the sketch shows, the new sand, old sand and cement bins are located alongside each other. Below these bins, and above the mullers, in an enclosed area, is a self-powered lorry having a built-in scale. One side of the lorry tunnel is glass enclosed and the entire area is under a slight negative pressure to keep the atmosphere clear of dust.

In preparing a mix, the operator guides the lorry, via the rod-like motor controls, visible in Fig. 4, from bin to bin, and by means of the bin chute control levels seen at the top of the photograph, admits a weighed amount of each component into the lorry. Then the lorry is put in position over the mulling machine and a measured amount of water is added. This water is measured by a meter, visible near the operator's left hand in Fig. 4. This set-up represents a singular advance over the old shovel method but, of course, is economically feasible only where quantities handled justify it.

The base sand used at the Ansonia foundry is a No. 30 New Jersey silica sand, with about 75 per cent of the grains concentrated on the 40, 50 and 70 mesh sieves. The sand is a No. 6 sand, according to A. F. A. fineness classification. When this sand is ordered it is specified that no more than 0.2 per cent pass through the 200 sieve and as little as possible below the 150 sieve. A comparison of the grain distribution of a typical car of new silica sand and a batch of the reclaimed sand is given in Fig. 5.

Four basic mixes are used to cover all steel and iron casting requirements at the plant. No. 1 mix consists of silica sand and cement and is used as a facing for steel molds. Mix No. 2 is made up of ½ new sand and ½ old sand plus cement, and is used for facing iron molds. On the two molding machines an all old sand, plus cement mix is used, while No. 4 mixture, used as a backing sand, consists of all old sand and a smaller quantity of cement.

While the amount of new sand used varies with the trend in the demand for the various mixes, the average monthly ratio is approximately 1 part new sand to 3 parts old sand. The ultimate aim, and one which it is felt is within reach, is to bring the new sand additions down to 10 per cent.

The amount of cement used in each mix varies from 7 to 12 per cent, depending upon the type of castings being made. In making the cement additions to the batches, the cement contained in the reclaimed sand is considered as zero. While actually the bulk of the cement is removed from the old sand by the exhausting and sieving process, a small amount remains firmly affixed to the grain. This cement coating has some remaining bonding power, as investigations have shown, but it is so small that it is taken as having no influence on the mix.

The adjustments of the reclaiming system are directed toward giving the reclaimed sand a structure similar to the base sand, the No. 30 New Jersey silica sand, so far as fines and grain distribution are concerned. The reclaimed sand does not have the same degree of fines as are present in the new sand and consequently has a much higher permeability. Comparable tests made at the plant indicates that a new sand with a permeability of 125 to 135, will have a permeability reading of about 200 after it has passed through the system.

Roughly 8 per cent of the material finds its way into the sludge collectors. This sludge is made up largely of cement fines and does possess some bonding qualities, but the quantity obtained is not sufficient to warrant its commercialization.

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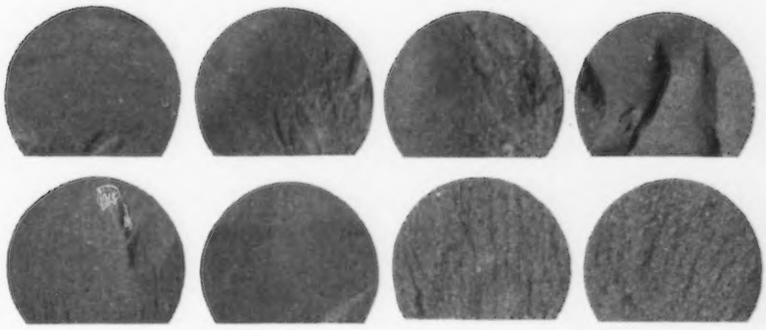
[1] Process developed by M. Durand of Cie Randupson, Marseilles, France. World rights are owned by Société d'Electro Chimie, d'Electro-Metallurgie et des Aciéries Electriques of Ugine, France. Exclusive United States rights are held by Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa.

[2] See: "Cement Bonded Sand Used by Mold Maker," THE IRON AGE, Nov. 19, 1936; "Bonding Steel Molds with Cement," *The Foundry*, December, 1935, January, February and March, 1936; "The New Foundry of David Brown & Sons, Ltd., with Special Reference to the Randupson Process," *Foundry Trade Journal* (London), Jan. 28, 1938; "The Randupson Process of Cement Molding," *Foundry Trade Journal* (London), June 23, 1938; "Manganese Bronze Propellers Cast in Cement Molds," *Shipbuilder and Marine Engine Builder*, October, 1938.



FRACTURES of hardened specimens. Hardening temperatures, deg. F. — Top row (left to right) 1450, 1500, 1550 and 1600; bottom row 1650, 1700, 1750 and 1800.

AIR-HARDENING DIE STEEL

A NEW air-hardening tool steel, designed to develop the characteristics desired in dies, punches and similar tools, has recently been introduced by Bethlehem Steel Co. The following approximate analysis was found to give the properties desired: Carbon, 1.00; manganese, 2.00; chromium, 2.00; molybdenum, 1.00 per cent.

The characteristics claimed for the steel are: (a) Good hardenability when air quenched, comparable to certain liquid quenched die steels; (b) low quenching temperature, 1550 to 1625 deg. F., 100 to 200 deg. F. below that required for certain other air-hardening die steels with equal hardness—the furnace operation is thus simplified, the chance of overheating the corners of a machined die is lessened, and distortion and danger of cracking are minimized; (c) satisfactory machinability in annealed condition; (d) high abrasion and wear resistance; (e) ease of heat treatment; and (f) good hardness penetration.

For forging this new steel slow and uniform heating is important, which is preferably carried out between 1950 and 2000 deg. F. If a preheater is available it is advantageous to hold the parts at 1200 deg. F. until thoroughly heated, before they are brought to full temperature in the forging furnace. Forging temperature must not drop below 1500 deg. F., and if necessary the parts should be reheated. Due to their air-hardening properties, the forged parts should be cooled in lime, ashes, silocel or some other heat retaining medium.

The annealing cycle prescribed has two purposes, to produce a steel with good machinability, and to develop a structure which will insure effective response in air-hardening. A Brinell hardness under 229 on small and medium sized parts is developed by heating slowly and uniformly to 1600 deg. F., holding at that temperature for at least 1 hr. per in. of average thickness, and cooling at a rate of 20 deg. F. per hr., down to about 400 deg. F. The parts are then reheated to 1325 deg. F. and held at this temperature for about 4 hr. per in. of thickness. Finally they are removed from the furnace and cooled to room temperature.

An alternate annealing cycle may be used provided slightly higher hardness is not objectionable. This cycle consists of heating slowly to 1400 deg. F. and holding at that temperature at least 1 hr. per in. of thickness of the average dimensions. Cooling is carried out at a rate of 20 deg. F. per hr. to 900 deg. F., followed by furnace cooling to room temperature.

It is stated that care must be exercised in heating and quenching in order to keep distortion to a minimum, and to prevent decarburization. The steel should always be heated slowly to the hardening temperature. Pack hardening is advocated for large parts, to insure maximum surface hardness. If possible it is well to preheat to about 1200 deg. F., and soak thoroughly at that temperature. The recommended hardening temperature is 1550 to 1625 deg. F., depending on the size of the piece. The pieces should be held at the hardening temperature for 1 hr. per in. of average thickness. They are then air cooled. For large dies an air blast should be directed against the face during hardening.

Parts are charged into the tempering furnace after cooling to about 200 deg. F. Depending upon size and degree of hardness desired the temperature is then slowly raised to between 325 and 375 deg. F., where it is maintained for at least 1½ hr. per in. of average thickness. This is followed by slow cooling to room temperature.

Tests were carried out with steels of the following analysis: 0.95 C, 2.04 Mn, 0.016 P, 0.017 S, 0.23 Si, 1.93 Cr, and 1.04 per cent Mo.

Dilatometric tests on 1-in. round specimens, heated and cooled at a rate of 400 deg. F. per hr. gave the following ranges:

Heating: Ac range, 1370 to 1440 deg. F.

Cooling: Ar range, 1300 to 580 deg. F.

For hardness tests, specimens 1-in. square and 4 in. long were hardened in still air at temperatures ranging from 1450 to 1800 deg. F., at 50-deg. intervals. The hardened specimens were fractured and fracture ratings and Rockwell hardness determined. The accompanying photograph shows the fractures. The fracture ratings are 9¼, 9¾, 9¾, 9½, 9, 8¾, 5, and 4½. The Rockwell hardness figures are 57, 62, 63, 63, 63, 63, 46 and 44.

METAL CLEANING

By C. C. HERMANN and
R. W. MITCHELL*

TWELFTH in a Series of Articles on the Technical and Economic Aspects of Metal Cleaning and Finishing

CLEANING of metal parts is often accomplished by blasting, tumbling, rolling and burnishing. The method used depends partly upon the type of metal being cleaned, the size and form of the article, and partly on the final finish to be given the parts.

Sand blasting is the most common of the blasting series due to the fact that it was the first method used for this type of cleaning. As the name implies, the sand, which is used as the abrasive, is hurled against the work surface by a blast of air. In the great dust bowl of the Middle West sand blasting is carried on by the winds picking up the dust particles and carrying them with some force against objects. Paint is removed from buildings, farm implements and automobiles by this action of the elements.

In industry, sand blasting is carried on in a more scientific manner than is evidenced in nature. In the first place the abrasive sand is selected with great care to obtain the hardest grains possible, and, secondly, it is classified to provide a uniform size of grain. This material is then projected toward the surface to be cleaned by the use of a stream of compressed air at 100 lb. gage pressure or over.

In the development and refinement of this type of cleaning apparatus, other abrasives than sand have been discovered which are less harmful to human health, produce a better surface on the work and do the work in far less time. Such materials as metal shot not only reduce the amount of dust emanating from the operation but reduce to a certain extent the silica hazard as well as the maintenance expense of nozzles.

Considerable study has been made of nozzle wear, effect of grain contour on nozzle wear and the force required to make the abrasive effective. Tungsten carbide nozzles have been used and show a life exceeding that of chilled iron by four to five times. Boron carbide is also used in nozzle construction at a material saving in nozzle expense. These materials are the hardest known, only being exceeded by the diamond. Power is saved by the prolonged retention of nozzle size.

Experiments have shown that granular abrasives wear the nozzles much faster than globular grains. Likewise it requires longer blasting to clean with the globular grain than it does with the granular grain. Again, the globular grain can be projected with greater speed with less wear on the nozzle than the granular grain. Considering all data pertaining to both kinds of abrasive, it is readily apparent that metal shot is the preferred material.

When using 90 lb. gage compressed air at the nozzle, a 3/8-in. nozzle will pass 211 cu. ft. of free air per minute. This is the equivalent of 40.5 hp. If this nozzle is permitted to wear to, say, 7/16 in., the air flow increases to 286 cu. ft. of air per minute and the horse power increases to 54.9, an increase of over 35 per cent. It is obvious, therefore, that nozzle wear is important and requires due attention if economy of operation is to obtain with the sand blast method.

In Fig. 1 is shown a rotary table blast machine in use at SKF Industries, Inc., for cleaning the surfaces of bearing races following heat treating. In this operation the heat treating scale is removed prior to grinding. The races, which are 8 in. in diameter, are laid on the rotating table and carried under the blast nozzles. The operation is continuous since cleaned parts are removed and other parts are placed on the table at the front of the machine. The time required for cleaning is from 20 to 25 min.

This type of equipment is relatively high in initial cost, ranging from $2500 to $3500 depending on the size of the machine. However, the machines prove to be economical in labor cost as well as improving working conditions in the cleaning room.

Almost any desired finish on the surface of the work may be obtained by the blasting method by using the proper abrasive or mixture of abrasive. Blasting, however, does not polish the surface, although the surface may be given a satin finish by the use of low air pressures. For ferrous metals the air pressure for straight cleaning should be from 60 to 100 lb. gage. For non-ferrous metals the pressure should be from 10 to 60 lb. gage, depending upon the nature of the work and the degree of cleaning desired.

In Fig. 2 is shown a machine known as the Roto-Blast built by Pangborn Corp. at Hagerstown, Md. This equipment uses metallic abrasive which is delivered against the work by compressed air to perform the work of cleaning. This type of equipment is adaptable to cleaning practically all kinds of work and is particularly adaptable to cleaning small or fragile

*Technical director, Magnus Chemical Co., Garwood, N. J.

BY SAND BLASTING, TUMBLING, ROLLING AND BURNISHING

castings. For instance, at the Pennsylvania Lawn Mower Works the use of the equipment shown in Fig. 2 solved a bad breakage problem in connection with mower wheels. The loss due to breakage has been practically eliminated whereas prior to the installation of the Roto-Blast the breakage exceeded 10 per cent. A similar piece of equipment in use at the Fletcher Works, Philadelphia, is shown in Fig. 3. This equipment is used to clean cast iron parts prior to japanning and produces a remarkably clean surface.

Another type of equipment makes use of a high speed, special design wheel combining centrifugal, tangential and air dynamic forces to perform the work of cleaning. The centrifugal blast machine eliminates the necessity for compressed air and therefore the operation of an air compressor, which in itself is an expensive piece of equipment. The air compressor is not only expensive in power requirements but lubrication and maintenance are high, usually, and the percentage of air actually used in effective work does not exceed 50 per cent of that taken into the compressor, because of leaks in the distribution system.

Tumbling is the least expensive of all the mechanical cleaning operations. This may be justly claimed. However, some other claims are made for tumbling which cannot be satisfactorily verified, as for instance, the claim that tumbling actually increases the strength of the castings due to the peening action given the surface of the casting. While it is possible that this action does relieve some of the surface stress it is most unlikely that this advantage penetrates very far beneath the surface. The internal stress is best relieved by some standard acceptable method. Tumbling is one of the oldest forms used for surface cleaning. White iron stars or "jacks", small chips of iron, various sizes of other abrasives are used in the tumbling operation, mixed in with the work.

Rolling is very similar to tumbling. However, the term is usually applied to work that is placed in a tilted barrel and the barrel turned until the desired effect on the work is obtained. In both barrel rolling and tumbling, material is actually removed from the surface of the work, the amount removed depending upon the time the work is allowed to remain in the rotating machine and the amount, size and hardness of the abrasive used. Small parts of relatively simple construction may be placed in the barrel and rolled without aid of abrasive or other cleaning and cutting elements. However, work having deep recesses, of irregular contour, or designed with curves and twists, which cause them to entangle or nest, require other treatment.

Tilting barrels are usually used for rolling. By altering the tilt of the barrel the intensity of the rolling action may be changed. The speed of rotation is usually from 20 to 60 r.p.m. For light, fragile castings the lower speed is necessary to eliminate

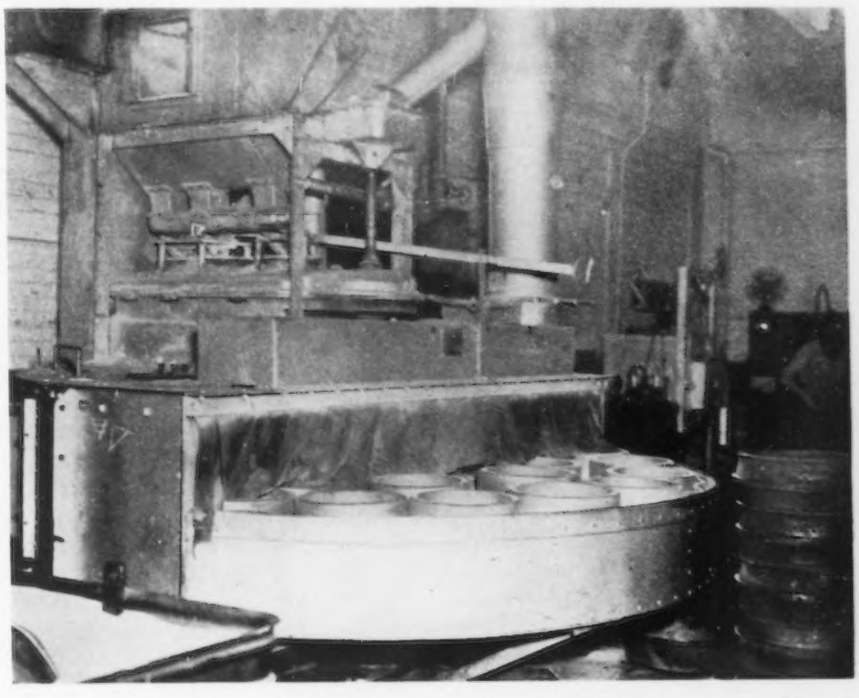


FIG. 1—Rotary table blast machine used for cleaning bearing races of heat treating scale. The time required for cleaning is 20 to 25 min.

excessive breakage. In some instances it has been necessary to line the barrel with leather or rubber to reduce the breakage. The average load for a tilt barrel is about 50 per cent full, as more than this will result in greater damage to fragile parts. The tilt barrel being open allows the operator to observe the work at any desired time and he can better judge when the work is ready to come out.

Tumbling and rolling may be either wet or dry, depending on the result desired. Acids may also be introduced into the barrel to facilitate the cleaning, although in such case the machine must be constructed of materials which will resist the acid corrosion. Wooden barrels are used for comparatively light articles and particularly when the work is brass and nickel silver. Wood does not withstand the heavy wear present when rolling heavy cast parts where sand and other abrasive is used.

Cast iron construction of the barrel is used where the parts are rolled wet, either with or without abrasives, This construction, however, is not preferred where the work is non-ferrous, such as high-grade brass which might become discolored by coming in contact with the metal of the barrel. Non-ferrous construction of the barrel is used when castings are to be rolled in the presence of acids and other materials which will corrode iron. Heavy sheet steel construction is used where the parts to be rolled are heavy with sharp corners which might chip the iron construction.

The work is removed from the tilting barrel by tilting below the horizontal axis and continuing the roll. The work tumbles out onto the floor or into a receiver with little or no labor involved. The work may be rinsed while in the barrel by passing a stream of rinse water through it. The inlet should be concentric with the axis and run to the bottom of the barrel by means of a rubber hose which displaces the solution by floating it out the open end. Sieve caps are sometimes placed over the open end of the barrel which permits draining before removing the load.

It is necessary to provide some means for removal of the material, metal, sand or clay taken from the work. This is done in the case of dry tumbling or rolling by the use of a dust exhaust system providing a suction equivalent to at least 2½ in. water gage at the outlet pipe. Along with such a system must be installed a dust collector which will remove the suspended dust particles from suspension in the air before releasing the air to the atmosphere.

In case no dust collector is used, the fine particles of dust will form a cushion for the work and ineffective cleaning will result. The interior surface of the barrel will also become coated with the material and increased cost of cleaning will result. In the case of wet tumbling or rolling, the wet material will be plastered over the interior surface of the machine as well as over the surface of the work, the result being that the cleaning operation will be ineffective and costly. Cleaning of the waste material from the barrel is therefore important for greatest economy.

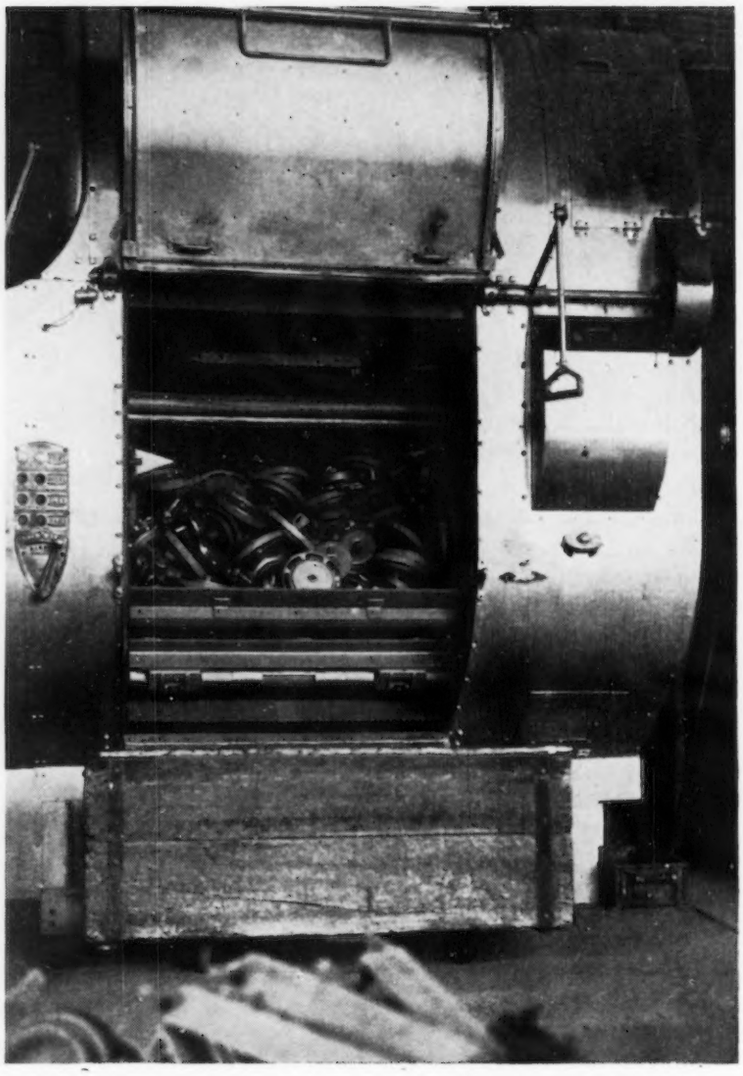


FIG. 2—Roto-Blast equipment, particularly adapted to the cleaning of small or fragile castings.

Burnishing is an operation designed to produce a high luster on parts which would be difficult to finish in any other manner. For example, steel balls for ball bearings as manufactured at Atlas Ball Co. are burnished in tilting steel barrels. In this case leather scrap is used in the barrel with the work, although in other operations the balls are tumbled in the presence of lime water to improve the finish.

Barrel burnishing is essentially a rubbing action between the work and other material used in the machine or between different pieces of work. When using other elements to produce the burnishing action, steel balls, cones, slugs and pins are used. The rubbing pressure depends on the depth of the work in the barrel as well as the weight of the work and the burnishing

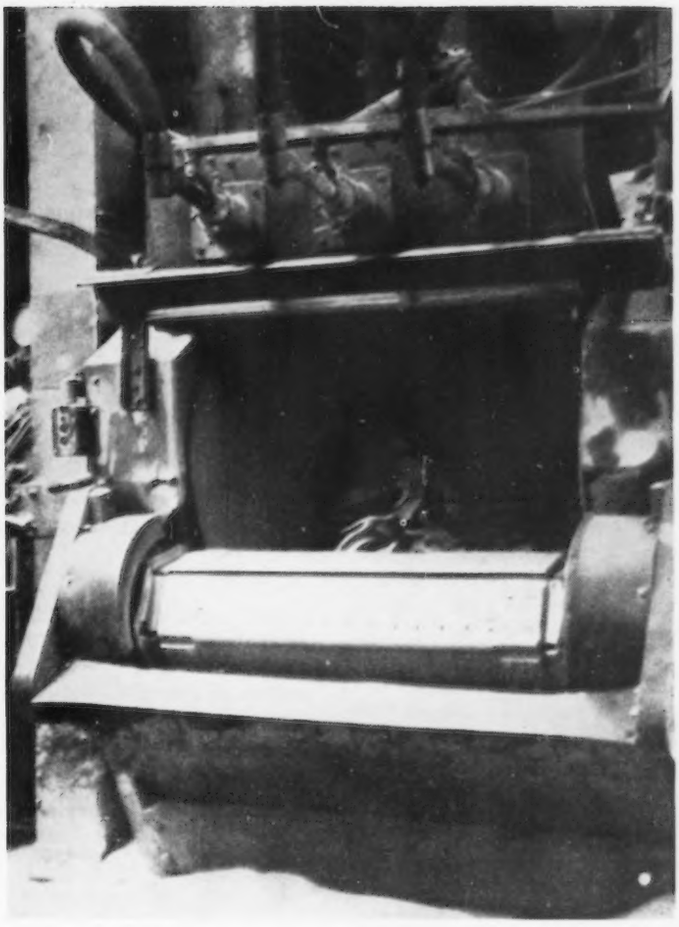


FIG. 3—Roto-Blast equipment used to clean cast iron parts prior to japanning.

element. The speed of rotation is a large contributing factor and varies with the work, the burnishing agent and the size of the barrel; usually it ranges between 20 and 60 r.p.m.

The amount of burnishing agent to place in the barrel varies with the work, its contour, and the degree of finish; however, it is usually equal to the weight of the work and may go as high as twice the weight of the work. It is better to err on the side of too much burnishing agent than too little, as the work will come out with a greater luster. It is also necessary (or at least advisable) to use a lubricant in the barrel to cover the surface of the work and prevent metal to metal contact during the operation. This prevents metal to metal abrasion and increases the luster.

In general, round steel balls are the best burnishing material. However, balls do not get into sharp recesses or corners of the work. The balls can be hardened, and do the best work on general surfaces due to their rubbing and rolling action. To burnish sharp recesses, corners and grooves in the work, finer burnishing material is required such as cones, fin-balls, pins and other forms.

It is advisable to keep the burnishing material mirror smooth. If left standing these steel elements will rust and then the first several loads of work will not be satisfactorily burnished. A dilute soap solution or a dilute solution of soda or alkali having a pH of 9.5 or greater will prevent rusting. Therefore the burnishing agent should be kept immersed in such solution when not in use.

To clean balls which have become coated with dirt picked up from the work, they should be rolled in a warm solution of sodium cyanide of about 1 oz. per gal. concentration. They may also be cleaned by rolling with metal cleaner in the barrel.

England Changes Forging Practice

UNTIL the last three years, it had been customary in England to produce drop forgings in a sequence of operations in different hammers, often requiring two or three heats, with proportionate volumetric loss to the billet in scale—averaging 5 to 7½ per cent per heat. These multiple operations were necessary because the drop forging equipment then in current use was incapable of accommodating dies with more than one impression. Partly as a result of accelerated preparedness program in recent years, however, there has been a growing appreciation in England of the great advances in drop forging technique made in the United States under the impetus of the demands of the automotive industry. These advances include improved die matching, a reduction of draft, a reduction in steam consumption per forging produced, more accurate and uniform sizing of forgings and greatly enhanced production. While the initial investment in modern dies and hammers must necessarily be higher, the total investment to produce a given quantity and quality of forging is less.

Illustrative of this trend toward the wider adoption of American methods and machinery in England is the recent installation of a 20,000-lb. steam hammer in the Sheffield Works of Ambrose Shardlow, Ltd., for the forging of the crankshaft for the Rolls-Royce Merlin aircraft engine. Appropriately enough, Sheffield is the very city in which Nasmith a century ago first introduced the steam operated forging hammer. This hammer is distinguished by a very high ratio of weight of anvil to falling weight, namely 25:1. The anvil has an approximate weight of 500,000 lb.; the machine as a whole, 700,000 lb.

The manufacturer of the hammer also places a great deal of emphasis on the design of the operating valve and the unbalanced porting of the steam cylinder. Little energy is required to accelerate the falling ram as back pressure under the piston is avoided. On the other hand, return of the ram is fast, due to large lower cylinder inlet, and building up of back pressure above the piston assures strong subsequent blows. A slide valve of balanced design is used in the Chambersburg hammers, and the steam or air is distributed to the cylinder internally. The valve chamber itself is subject only to exhaust pressure.

Theory and Practice of

By F. M. WASHBURN and
W. O. PHILBROOK

Assistant Superintendent of Metallurgy and Inspection, and Research Metallurgist Respectively, Wisconsin Steel Works, International Harvester Co.

ACCURATE slag control has so broadened the scope of the basic open hearth that increasingly uniform high-grade steels are being turned out today. The various phases of this control are covered in detail in this article. In the past two weeks the authors have dealt with slag formation, transfer of iron oxides, measurement of oxidizing power, elimination of carbon from the bath, rate of oxidation of slag and bath, and the effect of temperature. Herein, in the third section of the four-part report, details are given on elimination of silicon and manganese, and removal of phosphorus.

SUMMARY OF CARBON ELIMINATION: In summarizing the process of carbon elimination in the basic open hearth furnace, it must be emphasized that the reactions involved cannot be dealt with independently, but must be considered as a sequence of inter-related chemical reactions all tending toward the establishment of equilibrium conditions fixed by physical laws. These equilibrium conditions can never be reached in the practical operation of the basic open hearth process because the amounts of the components of the system are not constant, but are continuously varied in an irreversible manner by the introduction of oxygen by the flame and the removal of both carbon and oxygen by the carbon boil. Each reaction in the sequence affects all of the others. The melter has no control over the theoretical end-points, or equilibrium conditions, of these reactions because they are fixed by immutable physical laws. He does, however, have some measure of control over the rates at which the various reactions proceed toward their equilibrium conditions and the actual degree of approach to these end-points at various stages of the heat.

It has been shown that the minimum overall rate of oxidation of the slag-bath system during the refining and finishing periods of the heat is determined by the oxidizing power of the flame. Once the fuel and furnace have been selected for him, the furnace operator has only minor control over the minimum rate of oxidation of the heat within the furnace, although he may increase this rate by supplementary additions of ore or scale, the effect of which is specific and for a definite time interval only. The extent to which the oxygen supplied by the flame is applied directly to the removal of metalloids from the bath or allowed to accumulate in the slag is subject to some measure of control by the furnace operator through adjustment of the slag composition. Otherwise the gas-slag-metal system is governed by fixed conditions and physical laws.

It is desirable to assist the furnace in the performance of its natural functions and to postpone the accumulation of iron oxides in the slag as long as possible. Any attempt to upset the natural balance of the system will usually give a very transitory effect, as illustrated by Fig. 5. Here, the rate of carbon elimination had been proceeding at a uniform rate until 4500 lb. of burnt lime were added within a period of 17 min. This chilled and mechanically thickened the slag, with resultant decrease in the transfer of oxygen to the bath, and the carbon-drop curve flattened out rather abruptly. As soon as the slag was brought back to the proper temperature level and the lime began to go into solution, the oxygen accumulated in the slag was thrown down into the bath, and carbon elimination increased as sharply as it had slowed down. In a short time the excess oxygen was removed and the carbon-drop curve resumed a steady course which was almost an exact extension of the original curve, or the net result of the disturbance due to the lime addition was practically nil after 30 min. from the first lime addition. There was probably some diminution of the rate of carbon drop below what it would have been without lime addition because of an increase in the true viscosity of the slag.

As a further example, the authors at one time tried to lower the FeO content of the bath more nearly to equilibrium, in preparation for blocking, by increasing the velocity of the carbon-FeO reaction by means of local boils induced by charging cold billet butts. The theory was vindicated in that a reduction of the FeO content of the bath was actually obtained, but the result was useless from a practical standpoint because, within 10 min., the readjustment had taken place to give as much or more FeO in the bath as was present before the addition.

Although it is imprudent to attempt to make a general statement to cover all conceivable situations which might develop, it is believed that the time interval of the furnace in the readjustment of unbalanced conditions is ordinarily relatively short, perhaps of the order of 10 to 20 min. It may be emphasized again that any artificial slowing of the rate of transfer of oxygen from the slag to the bath below the rate of oxidation of the slag by the gas, to achieve a reduction of FeO in the bath, must be handled with great care and discrimination, because the resultant build-up of iron oxides in the slag may lead to an eventual sudden release of oxygen to the bath and thus give a higher FeO content at that time than would have obtained if no attempt at control had been made.

BASIC OPEN HEARTH SLAG CONTROL

Many of the principles involved in the removal of carbon in the basic open-hearth process are equally applicable to the elimination of the other elements, because the process is one involving oxidation by FeO dissolved in the steel bath, with the exception of sulphur removal. There are, however, certain specific conditions and equilibrium constants pertaining only to the elements in question.

Elimination of Silicon

Silicon is the most readily oxidizable element present in any appreciable amount in the charge. It is oxidized to a large extent by the direct action of the flame during the melting of the scrap and pig iron, if any of the latter is used. Silicon in hot metal reacts rapidly with the FeO present in high concentration in melted scrap, with the formation of SiO_2:

$$Si + 2FeO = SiO_2 + 2Fe \qquad (XI)$$

The silicon in the charge will have been almost entirely removed by the time the heat has been melted, the resultant SiO_2 being a major constituent of the early acid slags. The silicon must be largely eliminated from the steel bath before any substantial oxidation of carbon can occur, because silicon has a much stronger tendency to react with FeO than has carbon. The silicon content of the bath will be reduced to a mere trace before any deoxidizing additions are made. It is therefore unnecessary to discuss any equilibrium conditions for this reaction.

T. L. Joseph[9] found that the SiO_2 formed from the oxidation of silicon is also removed almost completely from the steel bath, and the authors' work shows that the silica content of a properly made heat, before silicon additions, will be well below 0.001 per cent SiO_2. Silica introduced into the bath as an impurity in ore additions will also be eliminated if sufficient time is allowed, but an increase in the SiO_2 content of the bath is noticeable immediately after an ore addition.

Insignificant amounts of aluminum, titanium and vanadium may be found in the charge, but as these elements are even more readily oxidizable than silicon, they are removed rapidly and completely. Aluminum oxide is more refractory and is perhaps more difficult to flux and remove from the bath than silica. It is known that the alumina content of a heat prior to additions containing aluminum is ordinarily below 0.003 per cent Al_2O_3.

Elimination of Manganese

The elimination of manganese in the basic open hearth process is unavoidable, but it is a disadvantage in the case of killed steels because manganese must again be added to the steel to bring the content up to that required by specifications for chemical analysis.

The amount of manganese actually lost in the slag in the making of a heat by the basic open hearth process, not counting losses from the furnace and ladle deoxidizer additions, varies with the amount of manganese in the charge, the amount lost in the flush slag on high iron heats, the volume of finishing slag, and the carbon content and temperature of the steel at the time the heat is blocked. This loss may range from 50 to 80 per cent of the manganese charged and is usually more toward the high side of this range. Much of this manganese may be recycled, however, if the basic slag from the open hearth is charged into the blast furnace.

The chemical reaction for the oxidation of manganese by FeO and the equilibrium constant derived by applying the law of mass action are as follows:

$$Mn + FeO = MnO + Fe \qquad (XII)$$

$$\frac{(Fe)\ (MnO)}{(Mn)\ (FeO)} = K_t \qquad (XIII)$$

There are several ways in which the equilibrium expression may be modified for more convenient application to open-hearth reactions. Different writers have used various modified expressions, and it is impossible to compare numerical values for the manganese equilibrium constants given in the literature without taking into consideration the manner of expressing the concentrations or activities of the components appearing in the equation. Since a rigorous conversion from one system of expression to another is often impossible without more information than is available, no extensive review will be attempted.

It is not possible to apply equation (XIII) directly to conditions in the steel bath because there is no known method of determining the amount of MnO dissolved in liquid steel in the presence of FeO. It is also impossible to restrict the calculation of the manganese constant to the slag phase because the solubilities of liquid iron and manganese in the slag must be very small and their concentrations cannot be determined. The expression is one of equilibrium conditions, however, and at equilibrium the ratios of FeO in the slag to FeO in the steel and of MnO in the slag to MnO in the steel are constant at constant temperature as required by the distribution law. At equilibrium, therefore, the following expression is true:

$$\frac{(MnO)_{slag}}{(Mn)_{steel}\ (FeO)_{slag}} = K_{mn} \qquad (XIV)$$

but the numerical value of the constant will be different from that of equation (XIII). The activity of iron is assumed to be approximately equal to unity and is included in the constant.

Although the above equation is true only for equilibrium conditions, a reasonable approach to a working constant is obtained in open hearth operations. Herty[1] reported a value of 2.50 for K_{mn} under ordinary operating conditions, where concentrations are expressed in weight per cent and $(FeO)_{slag}$ is the "available iron oxide in the slag," FeO + 1.35 Fe_2O_3, corrected for basicity. If

[9] T. L. Joseph, "Oxides in Pig Iron and in Basic Open Hearth Steel," Transactions of the American Institute of Mining and Metallurgical Engineers, Iron and Steel Division 125, 204-43 (1937).

the total iron content of the slag is used as a measure of $(FeO)_{slag}$, a somewhat different value of the constant is, of course, obtained. The authors' work shows this constant, which might be termed K'_{Mn}, to be in the neighborhood of 3.0, and when total iron is approximately converted to Herty's "available iron oxide" for conditions pertaining to the authors' particular practice, the agreement with his constant is very close.

Although the basicity of the slag does not enter directly into the expression for the manganese equilibrium constant, it has a very decided influence in so far as it affects the activities of MnO and FeO in the slag. In acid slags, the FeO and MnO are partly bound as silicates, and the value of the constant decreases as the basicity increases until a point corresponding to the composition $2CaO.SiO_2$ is reached, after which the value of the constant does not change with further increasing basicity, according to data of Tammann and Oelsen as reproduced by McCance[10]. The value of the constant for basic slags from this curve is 2.5 [converting to expression as equation (XIV)], in excellent agreement with Herty's data, although the manner of deriving the activity of FeO from the slag analysis is not given by McCance. When the "total iron" analysis of the slag is used as a measure of iron oxide activity, the apparent value of the constant K'_{Mn} decreases slightly as basicity increases, as would be expected if part of the iron oxide is rendered inactive by the formation of calcium ferrite. In actual practical application, the uncertainty from this source is probably no greater than that caused by lack of knowledge of the exact temperature of the bath, and the value of 3.0 for K'_{Mn} may be used as a working approximation.

Temperature has a very marked effect upon the manganese equilibrium constant. By taking an average of all the information reported on the manganese equilibrium constant, Chipman[11] found the variation of K_{Mn} with temperature to be expressed by the following equation:

$$\log K_{Mn} = \frac{6600}{T} - 3.16 \qquad (XV)$$

From this equation, the values of K_{Mn} at various temperatures are as follows:

Tem., Deg. C.	Tem., Deg. F.	K_{Mn}
1500	2732	3.65
1550	2822	2.9
1600	2912	2.3
1650	3002	1.9
1700	3092	1.5

On the basis of these values of K_{Mn}, a slag containing 8 per cent of MnO and 10 per cent of active FeO would be in equilibrium with 0.35 per cent manganese in the bath at 1600 deg. C. (2912 deg. F.), while at 1650 deg. C. (3002 deg. F.) a slag of the same MnO and active FeO concentrations would permit a residual manganese in the bath of 0.43 per cent, or an increase of eight "points" of manganese for a temperature increase of 90 deg. F. This explains why the residual manganese content of the bath frequently increases during the latter part of the refining period as the bath temperature is increasing, in spite of the fact that the slag becomes more oxidizing.

The same effect has been used for many years by some melters, although perhaps without realization of the underlying theory, as an indication of the temperature of the bath. If the residual manganese was high for the charge and carbon content of the bath, the melter was fairly confident that his heat was hot, and vice versa. It also follows that the recovery of manganese from deoxidizing additions should be higher with high bath temperatures, other things being equal, but this effect is frequently masked by variations in slag viscosity and other factors having marked influence on manganese efficiencies.

Since manganese is removed from the bath by reaction with dissolved FeO, the effects of oxidizing power of the flame, rate of transfer of FeO from the slag to the bath, and viscosity of the slag, upon the rate of removal of manganese and upon the rate of attainment of "equilibrium" between slag and bath are entirely analogous to those already described for the carbon-FeO reaction and need not be elaborated for the manganese-FeO reaction.

The only marked differences are that temperature has a very pronounced influence upon the manganese-FeO equilibrium and only a minor effect upon the carbon-FeO equilibrium constant, and that the manganese equilibrium involves the MnO content of the slag as well as the manganese in the bath. It also seems rather likely that the approach to equilibrium is probably closer in the case of manganese than of carbon, because the oxidation of manganese does not involve the formation of gas bubbles against the ferrostatic pressure of the bath and slag, but this is largely surmise. It might also be mentioned that if manganese and carbon are both in equilibrium with FeO, they are in equilibrium with one another.

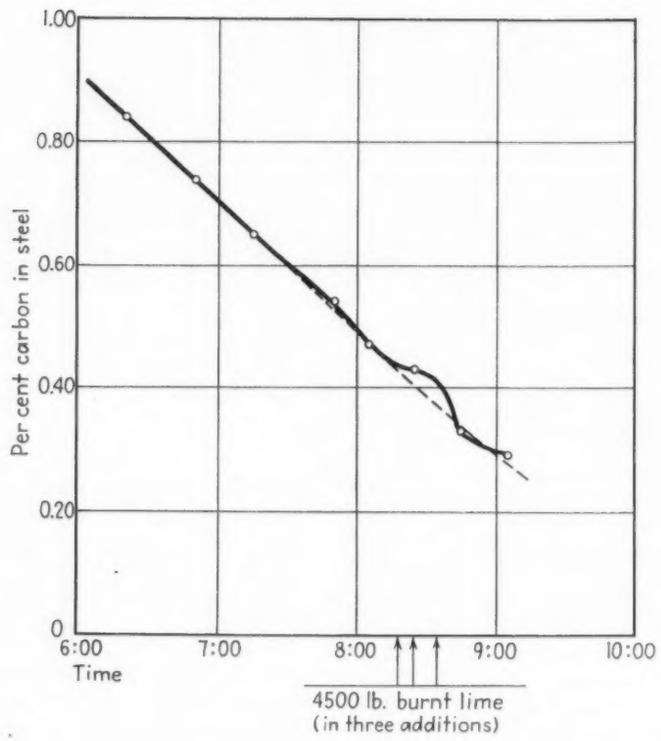


FIG. 5—Effect of burnt lime addition on rate of carbon drop.

Removal of Phosphorus

The elimination of phosphorus from the steel is one of the most important functions of the basic open hearth

[10] A. McCance, "The Application of Physical Chemistry to Steel Making," Iron and Steel Institute (London) Symposium on Steel Making, Advance Copy, 1938.

[11] John Chipman, "Application of Thermodynamics to the Deoxidation of Liquid Steel," Transactions of the American Society for Metals 22, 385-433 (1934).

process, for this ability to remove phosphorus from the metal is one of the factors which has made this process the largest tonnage producer of steel today. The chemical reaction by which phosphorus is removed from the steel bath and fixed in the slag probably occurs in two steps:

$$2P + 8FeO \rightleftarrows 3FeO.P_2O_5 + 5Fe \quad (XVI)$$

$$3FeO.P_2O_5 + 3CaO \rightarrow 3CaO.P_2O_5 + 3FeO \quad (XVII)$$

Equation (XVI) is easily reversed, and ferrous phosphate is unable to exist in any appreciable amounts in liquid steel. For practical application to the basic open hearth process, the reaction for phosphorus elimination is usually considered to be the sum of equations (XVI) and (XVII), or:

$$2P + 5FeO + 3CaO \rightarrow 3CaO.P_2O_5 + 5Fe \quad (XVIII)$$

The mass action expression for the equilibrium constant of the above reaction is as follows:

$$\frac{(3CaO.P_2O_5)\,(Fe)}{(P)^2\,(FeO)^5\,(CaO)^3} = K_p \quad (XIX)$$

This equilibrium expression involves the concentrations of tricalcium phosphate and of free lime in the slag, of FeO in either the slag or the bath, and of phosphorus in the bath. The activities of tricalcium phosphate and of free lime in the slag should be expressed as mol fractions, and our knowledge of the constitution of molten slags does not justify any calculations of exact constants. Equation (XIX) is nevertheless very useful in a qualitative way in explaining the conditions necessary for phosphorus elimination.

Substantially complete removal of phosphorus from the steel requires both a basic and an oxidizing slag, and the requirements for phosphorus removal place definite minimum limits for the control of these properties of the slag. The FeO content of the slag is very largely a function of the carbon content of the bath, and it is well known that a somewhat more basic slag is required to remove phosphorus to the desired extent from a high carbon heat than from soft heats, in order to compensate for the low FeO content. Any calculation of the mol fraction of "free lime" in the slag is highly speculative, and it is necessary to resort to some empirical measure of the basicity of the slag.

Several expressions for the basicity of the slag might be considered for application to theoretical calculations but the only one which is of value at present for control purposes is the ratio of lime to silica in the slag, because this ratio may be estimated visually from the appearance of samples of cooled slags, as described by Dr. Rudolph Back[12]. The method consists of pouring a relatively thin cake of slag, usually in a mold about 4½ in. in diameter and 1 in. deep, and noting its appearance after it has cooled below red heat.

From characteristic markings and structure of the top and bottom surfaces and the fracture of the cake, it is possible for an experienced observer to estimate the lime-silica ratio of the slag quite accurately over a wide range, as well as the iron content of working and finishing slags. Because of the general shape of the slag samples, this method of inspection of the slag is widely known as the "pancake test," and will be designated in this way in the balance of this paper. The ratio of lime to silica, per cent CaO/ per cent SiO_2, was designated by Back as the "V" value of the slag, and this terminology has been adhered to in this country. The "V" value is a rather arbitrary indication of the "basicity" of a slag because it does not take into consideration the fact that MnO plays the part of a strong base in early or "acid" slags, and the amount of acid P_2O_5 may be very appreciable in comparison with SiO_2 in finishing slags, but the pancake test has nevertheless proved to be a most valuable tool in slag control.

It has been rather generally assumed, on the basis of equation (XVIII), that no extensive elimination of phosphorus from the bath can take place until there is present in the slag an excess of lime over the amount required to form dicalcium silicate ($2CaO.SiO_2$). The ratio of CaO to SiO_2 in dicalcium silicate is $\frac{2 \times 56.08}{60.06} = 1.87$, and a "V" ratio greater than 1.87 would then be required for phosphorus removal. This assumption is not entirely true, as is illustrated by Fig. 6. This is not an equilibrium curve in any sense, but represents only the average conditions during four particular heats. Three of these heats were charged with 180,000 lb. of scrap and 100,000 lb. of pig iron of approximately 0.20 per cent phosphorus content and were tapped at 0.35 to 0.42 per cent carbon, and one of the heats was charged with 185,000 lb. of scrap and 95,000 lb. of pig iron and was tapped at 0.15 per cent car-

[12] Rudolph Back, "Die Schlackenprobe beim Siemens-Martin-Verfahren," *Stahl und Eisen* 37, 945-54 (1934).

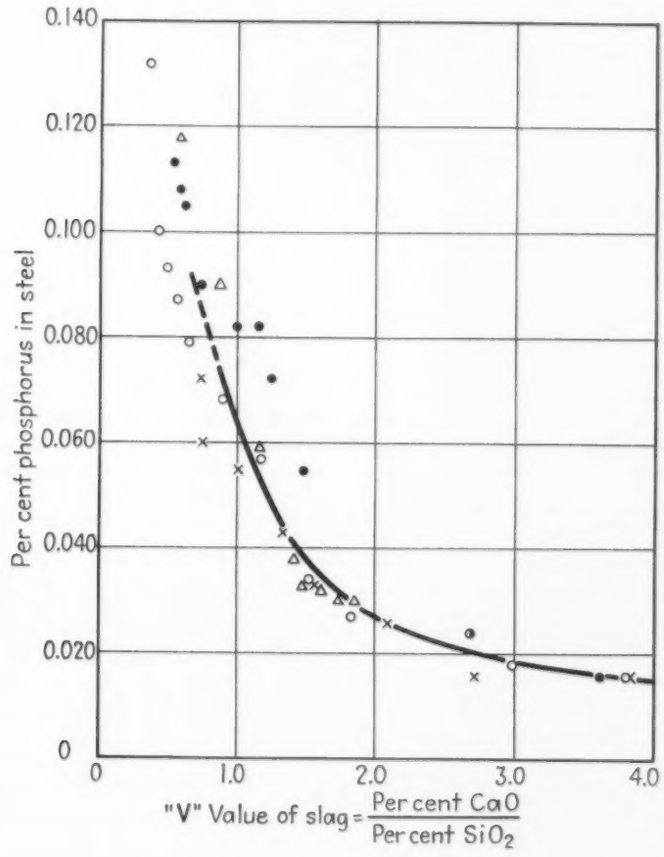


FIG. 6—Effect of basicity of the slag on the phosphorus content of the steel. Data from four heats.

bon. The estimated average phosphorus contents of the charges ranged from 0.081 to 0.092 per cent.

Sampling was begun some time before the heats were "under cover," so the points above about 0.075 per cent phosphorus represent dilution of molten metal high in phosphorus from the pig iron by the melting scrap of low phosphorus content. Even at this early stage there was some removal of phosphorus from the steel, because 0.39 per cent of P_2O_5 was found in a slag having a lime-silica ratio as low as 0.34, and the P_2O_5 in the slag increased continuously with increasing "V" value. It may be seen from Fig. 6 that on all of these heats, the phosphorus content of the bath had been reduced below 0.035 per cent before the "V" value of the slag reached 1.87. Part of this effect is due to the fact that manganese oxide functions as a base, at least until an excess of lime is present. If CaO and MnO are considered bases and SiO_2 and P_2O_5 as acids, a "neutral" slag having the composition of $2RO.SiO_2$ and $3RO.P_2O_5$, where RO represents either CaO or MnO, would correspond to about 0.055 per cent P on the four heats illustrated in Fig. 6, and removal of phosphorus with increasing basicity expressed in this way is most rapid at about this point.

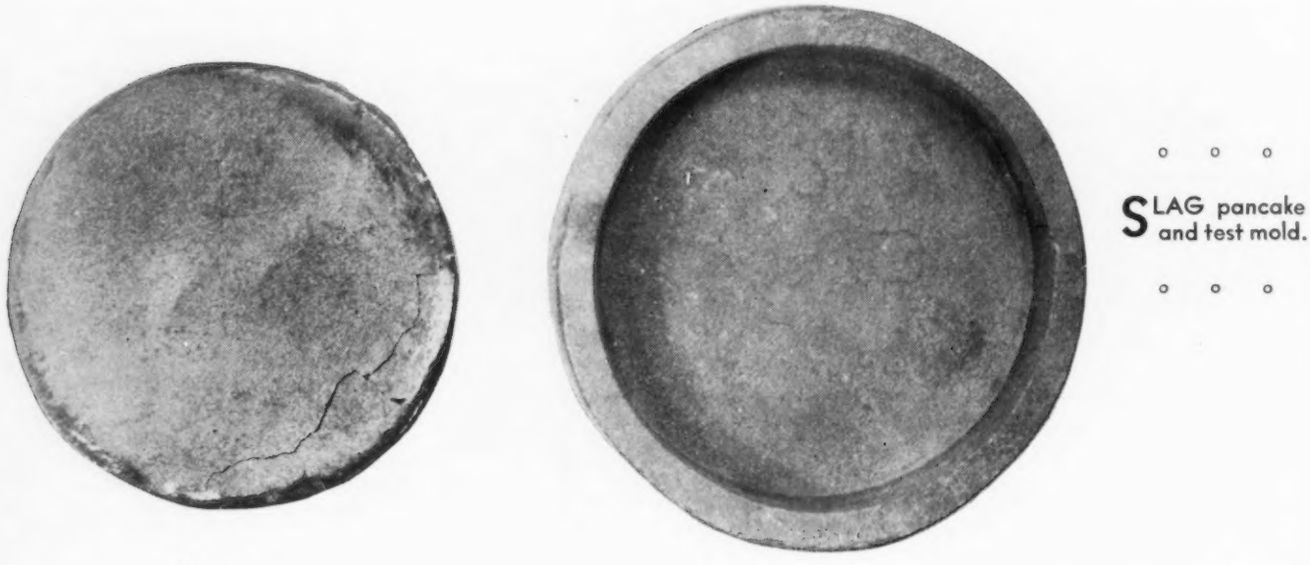
The above example shows that the phosphorus content of the bath may be reduced to a fairly low figure under what is ordinarily considered an "acid" slag. However, in order to remove phosphorus more completely, to prevent reversion of phosphorus during furnace deoxidation, and to minimize the loss of manganese in the slag by releasing it from functioning as a base, it is necessary to increase the lime-silica ratio of the slag above 1.87. A "V" ratio of the slag during the refining period of 2.5 is sufficient for the removal of phosphorus to the required extent for practically all grades of steel made with iron of about 0.25 per cent phosphorus.

The basicity required to prevent phosphorus reversion during furnace deoxidation will vary with the amount and strength of deoxidizers added, the time interval of the furnace deoxidation, and the carbon content of the bath. For light blocks of short duration, such as are used for semi-killed steels, a "V" value of 2.8 is usually safe, but for the longer and more drastic furnace deoxidation practices employed in making forging and alloy steels, "V" ratios above 3.0 are frequently necessary to prevent phosphorus reversion. Lime-silica ratios in this range are also necessary if for some reason the phosphorus content of the bath must be extremely low, or if the phosphorus content of the charge is rather high.

In addition to lime and FeO, rapid removal of phosphorus from the steel requires a fluid slag and vigorous action in the bath. The reaction by which phosphorus is fixed in the slag takes place at the slag-metal interface, and good convection is necesary to replace phosphorus, FeO, and CaO consumed by the reaction at the interface and to carry the calcium phosphate thus formed into the body of the slag to prevent any reversal of the reaction. Excessive basicity of the slag hinders, rather than aids, the removal of phosphorus by creating a viscous slag and sluggish action. L. Losana[13] found that the speed with which phosphorus was removed from mild steel by basic slags varied with the fourth power of the viscosity of the slag. The great importance of slag fluidity on phosphorus removal may be easily and forcefully demonstrated in actual practice.

Temperature has an effect upon the phosphorus reactions very similar to its influence on the manganese equilibrium. Higher temperatures give a higher residual phosphorus content in the bath, other conditions being equal: low temperatures favor phosphorus elimination. For this reason, it is desirable to get a sufficient amount of lime in solution in the slag as early as possible in the refining period, while the temperature of the bath is still relatively low, in order to remove the phosphorus from the steel. Increasing basicity and iron content of the slag as the heat progresses will tend to counteract any tendency toward reversion with increasing temperature.

Ed. Note:—Next week this report will be concluded with data on the removal of sulphur, and an extensive treatment of the subject of "practical slag control."



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SLAG pancake and test mold.

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[13] L. Losana, "The Fluidity of Slags and Processes for Refining Steels. II. Dephosphorization," *Metallurgia Italiana* 26, 851-60 (1934); cf. *Chemical Abstracts* 29, 711 (1935).

HIGH SPEED TENSION MACHINE

NAMED for R. L. Templin, chief engineer of tests, Aluminum Co. of America, the Templin machine, an improved type of precision metal working equipment capable of exerting a force of 3,000,000 lb. in compression and 1,000,000 lb. in tension, was formally demonstrated at Aluminum Co.'s New Kensington, Pa., plant last week to a group of testing engineers, government officials, military and naval officers, and industrialists.

This very large piece of equipment which is classified as the most powerful of its kind—it can exert maximum compression and tension at speeds up to 36 in. a min.—is the most recent addition to the Aluminum Co.'s research laboratories. Built by Baldwin-Southwark Corp., Philadelphia, it can be operated as an extrusion, forging, or forming press. In addition, it is provided with auxiliary equipment which will permit defining, within close limits, the relationships existing between the various forces involved in the plastic flow of aluminum throughout a wide range of conditions.

The illustration of the machine shown here reveals activity preceding the pulling apart of a large aluminum riveted joint. The elevator around the machine has been raised so that the testing engineer can take a reading on the joint.

The overall height of the machine is 40 ft. 4 in., 25 ft. of which is above the floor line. It is 16 ft. 4 in. wide and 9 ft. front to back. In compression testing, 90 in. is available from right to left and 108 in. from front to back, with a maximum height of 186 in. In tension testing, a similar space is available from left to right, with a maximum height of 150 in. plus a 36 in. stroke.

For testing large structural specimens, a pump delivering 18 gal. of oil a min. is driven by a 20 hp. motor. A 300 hp. motor is needed for high speed testing when 270 gal. of oil per min. is used. In both instances oil is delivered at 1800 lb. per sq. in. pressure.

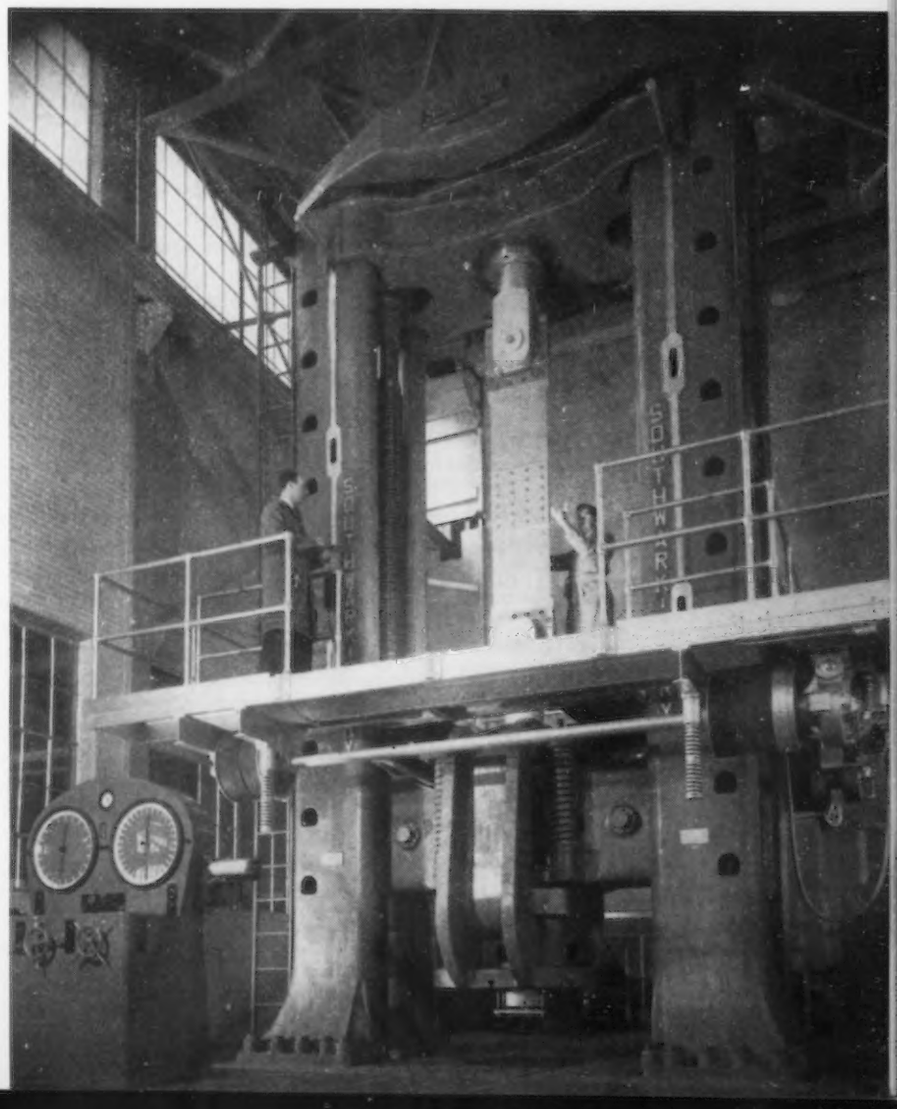
Extreme accuracy is necessary for the proper functioning of the machine. The Templin machine is capable of weighing a load of 3,000,000 lb. with an error less than two parts in a thousand, and yet has a sensitivity such that the weight of a man moves the indicator over nearly ¼ in. of arc in the low range. The machine will also record the pressure needed to crack an egg.

The high speed of 36 in. per min. is one of the most interesting features of the machine. The loading rate is such that the yield point of a given specimen would be passed in less than 1 sec., and the specimen would fail in less than 15 sec.

Interesting data on existing testing machines, which particularly demonstrates the importance of the Templin machine, is given in a book entitled "Materials Testing Machines," published a few years ago by Chester H. Gibbons, engineer, Baldwin-Southwark Corp. According to Mr. Gibbons, the first American testing machine of which there is any record was developed by Philadelphia's Franklin Institute about 1832 and it is believed the load it could apply was in the neighborhood of 25,000 lb.

About 1875, construction of the "United States testing machine," with a capacity of 1000 lb. in compression and 800,000 lb. in tension, was begun by A. H. Emery of Chicopee Falls, Mass. It was installed at Watertown Arsenal near Boston in 1879 and stands there today after more than 60 years of continuous and satisfactory service.

A few years after the failure of the Quebec bridge in 1907, three notable examples of large capacity testing machines were constructed, one in Europe and two in the United States. The first was a 6,600 000 lb. compression—3,300,000 lb. tension machine erected at Lichterfelde, Berlin; the other two, both at the National Bureau of Standards in Washington, were a 10,000,000 lb. compression machine of the Olsen type and a 2,300,000 lb. compression—1,150,000 lb. tension machine of the Emery type. Speeds of the 10,000,000 lb. machine vary from ½ in. a min. to 1/60 in. a min.—in contrast to the 36 in. a min. speed of the new machine at the Aluminum Co.'s research laboratories at New Kensington.



Industrial

BY ROYAL G. TOBEY
Physics Department
Eastman Kodak Co., Rochester, N.Y.

ALTHOUGH industrial radiography is usually associated with high kilovoltage, there exist some industrial applications for extremely low voltage radiation. H. F. Sherwood[11] has used enlarged soft X-ray radiographs to study the fibers of various paper stocks and the success of different bonding media in the manufacture of corrugated cardboard. Stereoscopic radiographs can be studied to determine the weave of yarns, showing the path any one strand takes in relation to the others. Cork, felt, plastics, and wood have been successfully examined by soft X-ray methods.

G. L. Clark[12] has described a new application of soft X-ray radiography whereby the grain structure of thin metal samples may be studied. The advantage of his method lies in the ability to enlarge the radiograph 100 to 200 diameters. Thin sections of metals may be radiographed in contact with a fine-grained photographic emulsion. Four to 5-kv. X-rays, diaphragmed at the specimen to approximately 5 mm. would, with 50-ma. tube current, produce a satisfactory image in 5 min. The image may be enlarged by projection on a screen or by use of a microscope.

Of particular interest to industrial radiographers are the industrial intensifying screens recently provided for their work. Although the actual time required to make an exposure is often short when compared with the time necessary to arrange the subject material, it is desirable to keep exposures as short as is consistent with quality, for the sake of economy of tube life. In the location of most defects in materials requiring high kilovoltage X-rays, industrial calcium tungstate intensifying screens may be used to reduce tube operation to a fraction of 1 per cent of the exposure which would be required using regular film without screens.

Flexible Screens

Little mention has been made in this country of *flexible* industrial calcium tungstate intensifying screens. They are available, however, and frequently can be used to good advantage. Photographically they are the same as industrial intensifying screens, but the back is much more flexible, so that by use of a curved or flexible cassette, they may be bent on a short radius. Pipe as small as 3 in. outside diameter may be encircled by a pair of these screens.

From medical radiographic practice, it might be expected that higher definition radiographs could be obtained by using high definition type calcium tungstate screens instead of the faster industrial type. Limited tests made by the author agree with M. Widemann[13] who has found that the advantage offered by high definition type screens is limited to ½-in. steel or less. For materials of greater thickness or absorption, the advantage in definition of the high definition screen seems to be offset by other factors, possibly including increased contrast, resulting from industrial type screen exposures. The speed advantage then determines the choice of the faster industrial type intensifying screens for use on ½-in. steel and over.

C. W. Briggs and R. A. Gezelius[14] have investigated the use of calcium tungstate intensifying screens for *gamma-ray radiography* and indicate that such screens are at present applicable only when good contrast and sensitivity in the detection of flaws are not required. At a fixed distance, the *exposure time per milligram* of radium was found to be less, the greater the quantity of radium. Similarly, for a fixed *quantity of radium*, the exposure time would be greater than that calculated from the inverse square law when the distance is increased. No failure of the inverse square law is involved in this difference, but rather it is a phenomenon known as the failure of the law of reciprocity.

Reciprocity law failure in photographic exposures has been the subject of a paper by L. A. Jones and J. H. Webb[15]. Photographic materials when exposed to light, such as is the case with fluorescent calcium tungstate intensifying screens, do not produce density according to a simple product of intensity of light times the duration of the exposure. For every emulsion there exists an optimum intensity at which the exposure required to obtain a definite density is less than that required at any other intensity. As the intensity of light is reduced, the

[11] H. F. Sherwood, "The Radiography of Cloth and Rayon," Textile Monthly, 17, 51, May, 1936. H. F. Sherwood, "Stereoscopic Soft X-Ray Examination of Parchment Antiphonaries," Technical Studies, 6, No. 4, 277, April, 1938.

[12] G. L. Clark, "X-Ray Photomicrography," Photo Technique, 19, December, 1939.

[13] M. Widemann, Über Verstärker als Hilfsmittel der Röntgenprüfung Metallischer Körper," Fortschritte Gebiete Röntgenstr., 55, 391, April, 1937.

[14] C. W. Briggs and R. A. Gezelius, "A Study of Intensifying Screens for Gamma-Ray Radiography," A.S.T.M. Proceedings, 38, Part 2, 303, 1938.

[15] L. A. Jones and J. H. Webb, "Reciprocity Law Failure in Photographic Exposures," Journal Soc. Mot. Pict. Eng., 23, No. 3, 142, 1934.

[16] H. E. Seemann, "Some Physical and Radiographic Properties of Metallic Intensifying Screens," Journal Applied Physics, 18, No. 12, 836, December, 1937.

[17] "Kodalk X-Ray Developer," Radiography and Clinical Photography, 15, No. 2, 28, January, 1939.

[18] "Abolish Darkness from Your Processing Room," Radiography and Clinical Photography, 15, No. 1, 13, 1939.

[19] "Fundamentals of Radiography," Eastman Kodak Co., Rochester, N. Y.

Radiography

THE metal industry's inspection tool, X-rays, is rapidly undergoing change and refinement. Thus, the author's description herein of recent developments is particularly timely. Last week data were presented on recent machines, proper protection technique, continuous and planar inspection, etc. Herein, the report is concluded with descriptions of the use of low voltage radiation, flexible calcium tungstate intensifying screens, new types of developing solutions, etc.

exposure time will be more than expected from a simple time-intensity calculation as, for example, in the case of gamma-ray exposures with calcium tungstate screens.

Briggs and Gezelius found that 1/32-in. lead filter placed on the face of the cassette improved the quality of a radiograph made with fluorescent intensifying screens. Only a slight decrease in density resulted from this added filtration. Their work would indicate the use of lead-foil screens in contact with the film instead of fluorescent screens whenever practicable. It is common practice in gamma-ray work to sandwich two films between three lead foils so that by viewing the two films in superposition, added density and contrast may be secured.

H. E. Seemann[16] has explained the use of lead-foil screens in contact with X-ray film to decrease exposure time and to improve radiographic quality by the removal of part of the secondary radiation. The intensifying effect of such screens depends upon electron emission rather than light emission as in the case of calcium tungstate screens. Lead screens may be used with either screen or direct exposure film but greater contrast and "speed" are usually obtained with the latter combination. No failure of the reciprocity law is known to exist with direct exposures, or with lead screens, either with X-rays or gamma-rays.

Lead has the fortunate properties of differential absorption and differential intensification of primary and secondary radiation. The differential is a favorable one as the undesirable secondary radiation of the subject is more strongly *absorbed* than is the image-forming primary. Also favorable is the condition that the image-forming primary radiation is more strongly *intensified* than is the secondary radiation. These combined effects tend to produce increased contrast when lead foil screens are used with either type of film. Therefore, even if the lead screen exposure were no shorter than a direct exposure, the differential absorption would produce a more detailed radiograph. Lead screens can often be used when calcium tungstate screens would be barred because of the unsharpness they produce in the image. This is generally the case in gamma-ray work. As well as improving contrast, gamma-ray exposure time may be reduced by as much as one-half when lead screens are used, as compared to direct exposures.

Direct Exposure Film

The new type of direct exposure X-ray film was introduced in 1937. This film, having an increased sensitivity to direct X-rays, is intended for use when fluorescent intensifying screens are unnecessary or unsatisfactory. When exposed to 200-kv. radiation, it has a direct X-ray speed more than twice that of the regular screen type film. With either film, an increase in contrast usually accompanies the use of lead screens. The higher contrast characteristic of no-screen film recommends its use particularly for gamma-ray exposures.

Another photographic advance has come in the form of a developing solution[17] which decreases development time considerably. Standard practice has been to develop screen films 5 min. at 65 deg. F. By the use of this new developer, development time may be reduced to 3½ min. at 65 deg. F. No appreciable change in contrast, film speed, or graininess can be noticed. Radiographs with somewhat greater contrast can be obtained by maintaining the 5-min. development period, but reducing exposures about 25 per cent.

A new X-ray processing room safelight filter has been produced which safely increases illumination about 10 times[18]. The new safelight filter gives a relatively bright amber-colored light by which it is easily possible to read labels, thermometers, and so forth. By the use of this light, darkrooms are converted into pleasant and efficient processing rooms. A manual[19] briefly describing radiography and processing room methods is available.

In the hands of experienced interpreters, the radiograph may give up its information only after considerable study. The methods employed in viewing radiographs should be the best in order to realize their ultimate value. There recently has become available a new type of illuminator containing fluorescent tubular lamps. The 14x17-in. size viewing box has two tubes 18 in. long and 1 in. in diameter, which emit light closely approaching daylight quality. They are mounted in a rectangular box about 5 in. deep. Because the tubes generate so little heat, the box can be made without ventilating ports. Being thus closed, the illuminators lend themselves particularly to use in foundry and shop where the more open types quickly become dirty with accompanying loss in brightness. Those who have occasion to make prolonged film studies will appreciate the coolness of this light source both as it concerns their physical comfort and the condition of the film.

For the purpose of viewing high-density portions of radiographs, a

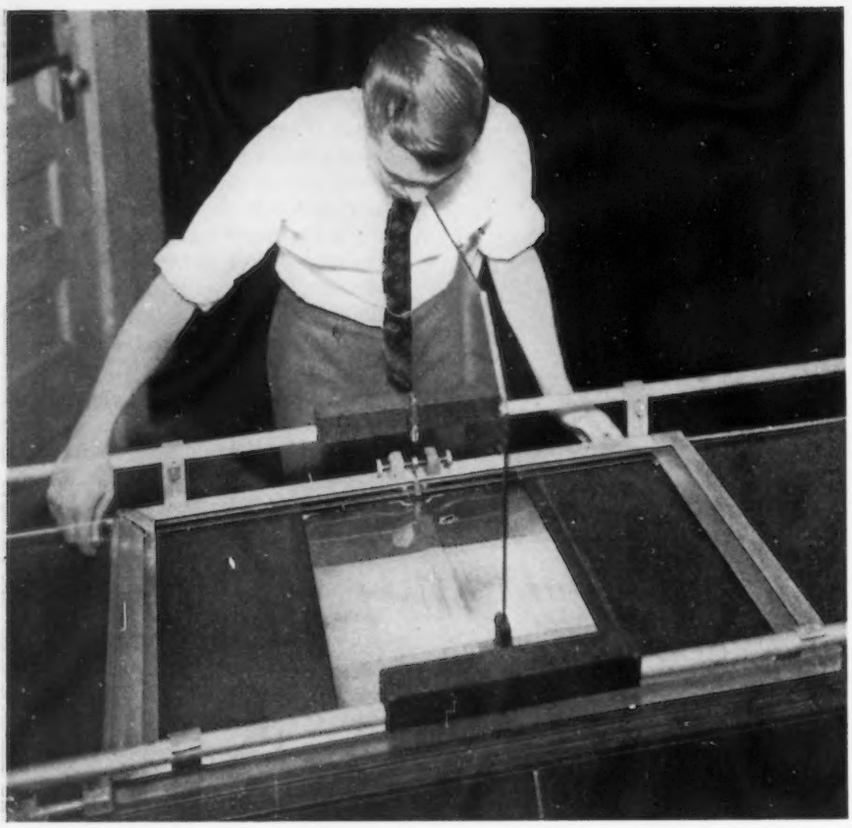


FIG. 6—A mirror stereoscope incorporated in the X-ray stereometer. Courtesy of General Electric Co.

high-intensity light source must be employed[20]. Control of the intensity is necessary and may be secured in several ways. Fig. 5 shows an 8x7 10-in. X-ray illuminator containing a No. 1 Photoflood bulb in series with a 100-ohm. rheostat of 2.4 to 1.2 amperes capacity. The rheostat supplies the illuminator with voltages ranging from full lamp voltage to 20 volts. The best level of illumination for any part of the radiograph can quickly be determined by visual observation as the intensity is varied.

In reading high density areas, it is important that an adjacent low density area does not pass sufficient light to dazzle the eyes, for if this is permitted, the sensitivity of the eyes will be materially lowered. To restrict the light to that area on which the attention is to be focused, a set of diaphragms should be available. The photograph shows such diaphragms, which are merely cardboards with various size circular holes cut therein.

Stereo-Vision

Unlike medical stereoradiography, the industrial stereo-pair seldom offers enough known points for depth comparison. With castings becoming more massive and assuming greater importance, it becomes vital that they should be homogeneous. For economy of time and material in repair of flaws, X-rays should tell just where the fault lies, and from what point the repair attack should be made.

As an aid in stereo-vision, the surfaces of the subject may be identified more clearly by the establishment of artificial planes. C. D. Moriarty[21] has described a means of establishing these planes within the subject in order to make depth determinations more accurately. Briefly, his system consists in locating several lead shot on the tube surface of the subject and a similar number located opposite the others on the film side of the subject, in approximately the same pattern. Stereo-views are made and lines are drawn on the radiographs connecting the corresponding shot on opposite sides of the material. By simple division of the lines so established into convenient like ratios, points are determined which, when connected, establish parallel planes *within* the subject. Thus, a flaw can be located in depth by reference to the neighboring planes, and in its lateral position by reference to the lead shot. This method has the advantage of requiring no investment in equipment, as the films can be read on any good stereoscope.

An inexpensive mirror stereoscope which consists of a thin sheet of glass or metal having mirror surfaces on both sides has been described by Moriarty[22]. The stereo films are laid on a horizontal illuminator with the mirror mounted vertically between them. Two people may view the films simultaneously and see the subject in three dimensions by placing their eyes close to and above the mirror. Fig. 6 shows the mirror in use on a stereo-pair prepared according to the method just described.

For use in laboratories where considerable stereoscopic work is carried on, Moriarty[23] has developed a stereometer with which depth measurements can be made within a specimen from a normal stereo-film pair. This instrument, utilizing only one reference mark on the subject, enables two people to view stereo-radiographs simultaneously, and by means of visual observations, a pair of hair lines may be mechanically positioned so as to coincide optically with any point in the subject. Actual depth measurements are then read on a scale located at the side of the instrument. Great accuracy is claimed for this stereometer. Fig. 6 shows the inspector, operating the controls which position the hair lines, as he views the three-dimensional image in the mirror stereoscope.

Proper interpretation of the finished radiograph is, of course, the final goal of the radiographic process. Interpreting ability depends greatly on experience and familiarity with the radiographic shadow appearance of known faults. V. E. Pullin[24] had radiographed quantities of castings, forgings, and metallic structures generally, subsequently dissecting them and comparing the sections with the radiographs. He has prepared an excel-

[20] W. L. Fink and R. S. Archer, "Radiography as a Tool in the Metal Industry," Transactions A.S.S.T., Vol. 16 (1929), p. 551.

[21] C. D. Moriarty, "Artificial Planes in X-Ray Sterescopy," General Electric Review, 84, February, 1937.

[22] C. D. Moriarty, "A Practical Mirror Stereoscope for X-Ray Examination," General Electric Review, 523, November, 1936.

[23] C. D. Moriarty, "A New X-Ray Stereometer," General Electric Review, 269, June, 1938.

[24] V. E. Pullin, "Engineering Radiography," G. Bell & Sons, Ltd., London, 1934.

[25] J. E. DeGraaf, "The Examination of the Macro-Structure of Raw Materials and Products with the Help of X-Rays," Philips Technical Review: 2:10, 314, October, 1937—2:11, 350, November, 1937—2:12, 377, December, 1937—3:3, 92, March, 1938—3:6, 186, June, 1938.

[26] H. H. Lester, R. L. Sanford, and N. L. Mochel, "Non-Destructive Testing in the United States of America," the Journal of the Institution of Electrical Engineers, 84, No. 509, 565, May, 1939.

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FIG. 5—High intensity illuminator showing diaphragms and intensity control device.

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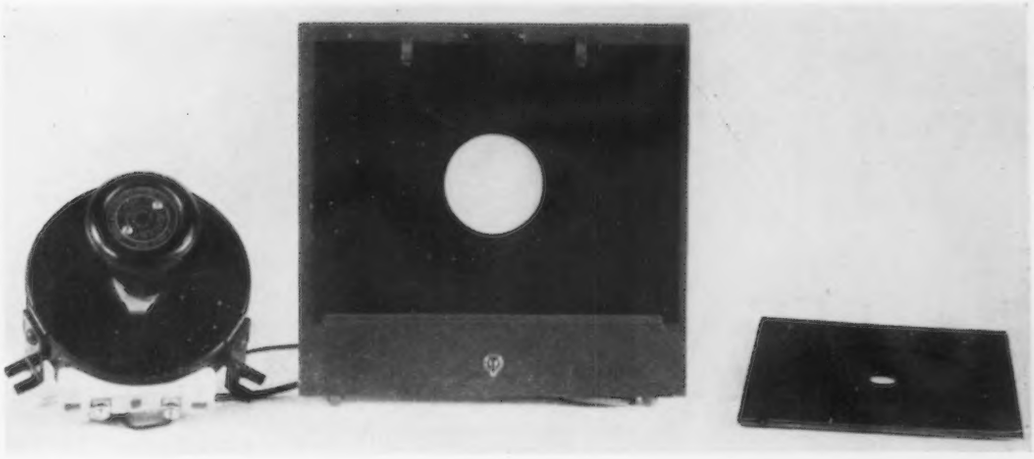


lently illustrated radiographic atlas by which interpretation of radiographs may be greatly facilitated. J. E. DeGraaf[25] has given several illustrated discussions of the appearance of some of the more common defects shown by radiographic films.

For those readers who have not undertaken radiographic studies, the following two texts are recommended as presenting a good introduction to the subject:

"Symposium on Radiography and X-ray Diffraction Methods," published by the American Society for Testing Materials, Philadelphia, 1937.

A. St. John and H. R. Isenburger, "Industrial Radiography," published by John Wiley & Sons, Inc., New York, 1934.

With the aid of X-ray inspection, the manufacturer may offer his customers increased assurance that a product is qualified to render the service expected. The benefits and economies of new manufacturing methods may be accurately determined. In the purchase of materials, castings, fabricated structure, and so forth, the purchaser has an acceptance testing method which, without destruction, indicates the soundness of his purchase.

H. H. Lester[26] has summarized the standing of industrial radiography in the United States today and particularly explained the action of committees dealing with this subject. Committee E-7 of the American Society for Testing Materials is actively engaged in research, standardization, and correlation. It is expected that future publications of this society will contribute to this method of nondestructive testing.

In the past 45 years, industrial radiography has come a long way, and, like the proverbial rolling snowball, should continue to progress and expand its applications in the years to come.

Loss of Manganese in Open Hearth

IN a recent issue of Mitteilungen aus dem Kaiser Wilhelm-Institut für Eisenforschung, P. Bardenheuer and G. Henke present a detailed account of investigations of methods of working an open-hearth furnace in the duplex process so as to reduce as much as possible the amount of manganese lost in the slag. One tilting and three fixed open hearth furnaces of 100 tons capacity were used for the tests, in the plant of Hoesch A. G. in Dortmund.

In the ordinary method of working it was observed that the molten metal as charged contained slag formers, mainly phosphorus pentoxide and silica, which necessitated large additions of lime, and this resulted in a large proportion of slag being formed and a large proportion of the manganese being lost.

The measures adopted to reduce the amount of slag and to assist the return of the manganese from the slag into the steel were as follows:

(1) The use of runners lined with a tar dolomite mixture instead of sand when transferring the open hearth iron from the ladle to the steel furnace.

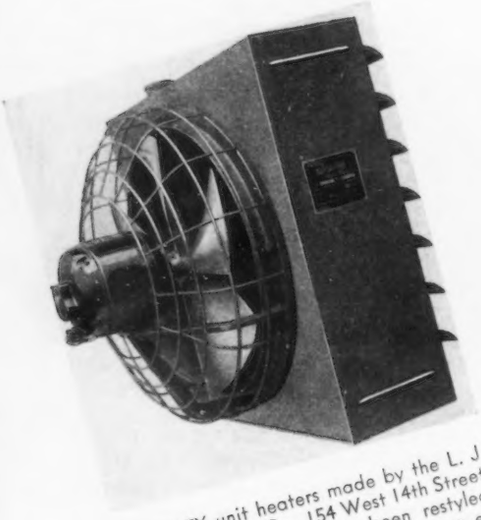
(2) Working the furnace with a high carbon concentration and taking care not to produce a highly basic slag.

(3) The adoption of a special method of teeming when tapping the finished steel.

The special method of teeming consisted of holding the ladle in an almost horizontal position against the runner from the taphole and gradually bringing the ladle to the vertical position as it filled. This prevented the metal from falling vertically into the ladle, and there was therefore no turbulence. The amount of manganese lost was reduced by 25 to 33 per cent by adopting this pouring procedure, and this resulted in a saving of 50 per cent in the ferromanganese additions. The investigators also presented tables giving full particulars of the weights and analyses of the materials charged, the slags and the steel produced, from which an accurate picture of the new method of working the Hoesch process to produce manganese steel can be obtained.

WHAT'S NEW IN PLANT SERVICE EQUIPMENT

THIS pictorial review of recently announced apparatus for general industrial plant use begins and ends on a note of worker comfort and safety. Heating and ventilating devices contribute toward the former end and goggles and eyeshields toward greater safety. Ranging in between are such miscellaneous items as pumps, pipe cleaners, tool stands, rolling grilles for plant protection, back pressure valves, rotating joints for supplying cooling water to steel mill rolls, compressed air auxiliaries, and portable dust collectors. For use in plant maintenance, the suppliers have introduced portable spray painting outfits, an aluminum ladder and a new type of tool for opening up pipe flanges to renew the gasket.



UTILITY unit heaters made by the L. J. Wing Mfg. Co., 154 West 14th Street, New York, have recently been restyled. The new sheet metal housing has an enameled finish and a smooth surface devoid of projections. It is rigidly bolted to the frame which supports the motor and fan. Featherfin heating elements, the Wing-Scruplex propeller fan and individually adjustable louvers are still retained. This unit delivers a single column of heated air horizontally.

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AUTOMATIC heat control of wide range to give comfort heating during the day and tempered heating at night for protection of plant materials and equipment is built into this new automatic unit heater developed by the Carrier Corp., Syracuse, N. Y. Control of temperature is afforded by a hydraulic action, bulb type thermostat which has a 60-deg. adjustable range. The control is built in, making installation simple and inexpensive. Fuel and power consumption is substantially reduced with this type of control. A special setting for fan operation is available for positive air circulation during the summer.

REXVANE vent sets, with rotors ranging from 6 to 24 in. diameter, are being offered by the B. F. Sturtevant Co., Hyde Park, Boston, as a blower or exhauster for general ventilating, air conditioning and fume exhaust. Capacities range from 250 to 6000 cu. ft. per min. at 1/4-in. static pressure. Central feature is the radial blade fan rotor, statically and dynamically balanced to eliminate vibration. Shape of blades is such as to permit high rotative speeds, lower outlet velocities and more dependable balance when handling air containing solid particles.

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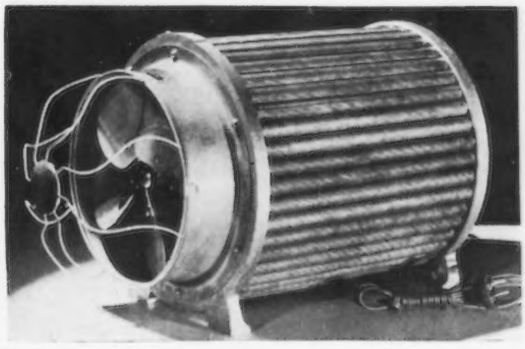
FLANGE-JACKS is the name given to a set of tools developed by the Garlock Packing Co., Palmyra, N. Y., for facilitating the separating of flanges on pipe lines for the renewal of gaskets. A pair of the jacks are used on opposite sides of the flange, the hooks engaging bolt holes. The screws are tightened simultaneously by hand, the case hardened taper points serving to separate the flanges. These Flange-Jacks are made in three sizes to cover pipe sizes under 2 in. for standard flanges from 2 to 20 in., and for standard flanges 14 to 48 in.



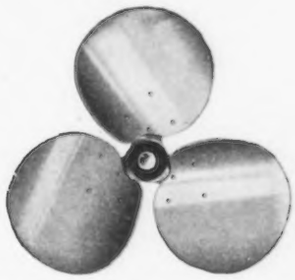
SQUIRREL cage Dorex odor adsorber for removing airborne odors in confined spaces. The portable unit shown consists of a fan inside a cylindrical shaped cage of closely spaced perforated metal cylinders containing highly activated, granular, coconut shell carbon, which will hold about 20 per cent of its own weight of odors. A type G adsorber is also made by the Dorex division of the W. B. Connor Engineering Corp., 114 East 32nd Street, New York, for application to existing ventilating or air conditioning systems. These adsorbers are employed in the same manner as an ordinary filter.

CLOGGED water lines and fittings as small as ½ in. in diameter may be opened and cleaned with a new size and type of cutting tool developed for use with the model A electrically driven pipe cleaning machine made by the Pittsburgh Pipe Cleaner Co., 223 Oliver Building, Pittsburgh. The operation consists in fitting the required length of coiled cable and cutter into the pipe and rotating the cable at 1100 r.p.m. In addition to water line work, these machines may be used for cleaning oil and gas lines, heating and cooling coils and superheat tubes. With the larger, model B machine sewer lines up to 6 in. can be cleaned.

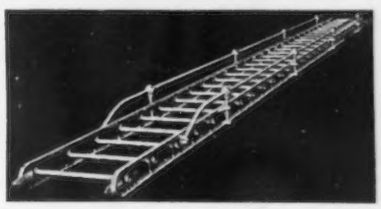
SERVICING has been greatly simplified in the new type HR back pressure valve made by the Connelly Iron Sponge & Governor Co., 3154 S. California Avenue, Chicago. Cleaning is done by simply removing a cap and withdrawing the working parts without disturbing the pipe line. This valve is made in a wide range of sizes and specifications. Another Connelly counterbalanced back pressure valve, known as type HV, features extreme sensitivity and perfect balance for vertical mounting. The movable disk is said to open and close positively with the slightest backflow of air, gas or liquids.

MOTOR and pump have been engineered as an integral unit in a new Monobloc centrifugal pump, announced by the Worthington Pump & Machinery Corp., Harrison, N. J. It is offered in sizes from 1 to 4 in., with capacities to 1000 gal. per min. against heads up to 280 ft. Shaft of large diameter is carried on rigid bearing mountings, maintaining concentricity of all rotating parts and increasing packing life. This Monobloc pump is available in bronze fitted, all-iron and all-bronze construction, horizontal or vertical mountings, with motor of any electrical specifications.

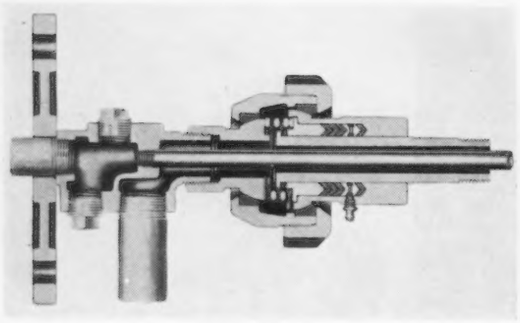
LATEST innovation in self-propelled air compressors is the adaptation of Schramm conversion heads to Ford V-eight truck engines. Basically, the unit is a four cylinder engine and a four cylinder air compressor in an eight cylinder block. By manipulating several controls in the cab, the unit is converted from an air compressor to a truck motor and vice versa. The compressor delivers 55 cu. ft. of air per min. at 100 lb. pressure, sufficient to drive five or more spray guns, sand blast equipment and many types of compressed air tools. This modified engine-compressor unit, known as the Fordair, is made by Schramm, Inc., West Chester, Pa.



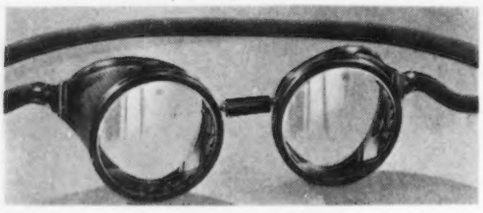
A NEW series of three blade fans for air circulator work is being marketed by the Torrington Mfg. Co., Torrington, Conn., in diameters of 10 to 30 in. By slightly increasing the blade pitch on these Airistocrat fans, the company claims to have obtained performance in free air equivalent to that of its four-blade fans of equal diameter. Although designed primarily for operation in free air, these blades may also be used for light pressure work, such as on evaporative coolers.



TYPE 800 ladder is the latest model in the line of single wall, sectional and platform ladders developed by the Aluminum Ladder Co., 130 Adams Street, Tarentum, Pa. It is equipped with handrails on both sides and steel or non-sparking aluminum spikes on the bottom. This ladder, especially suited for the storage of materials and maintenance work, can be supplied in lengths up to 36 ft. and in various widths. Rungs are corrugated to prevent slipping. Construction is entirely aluminum.

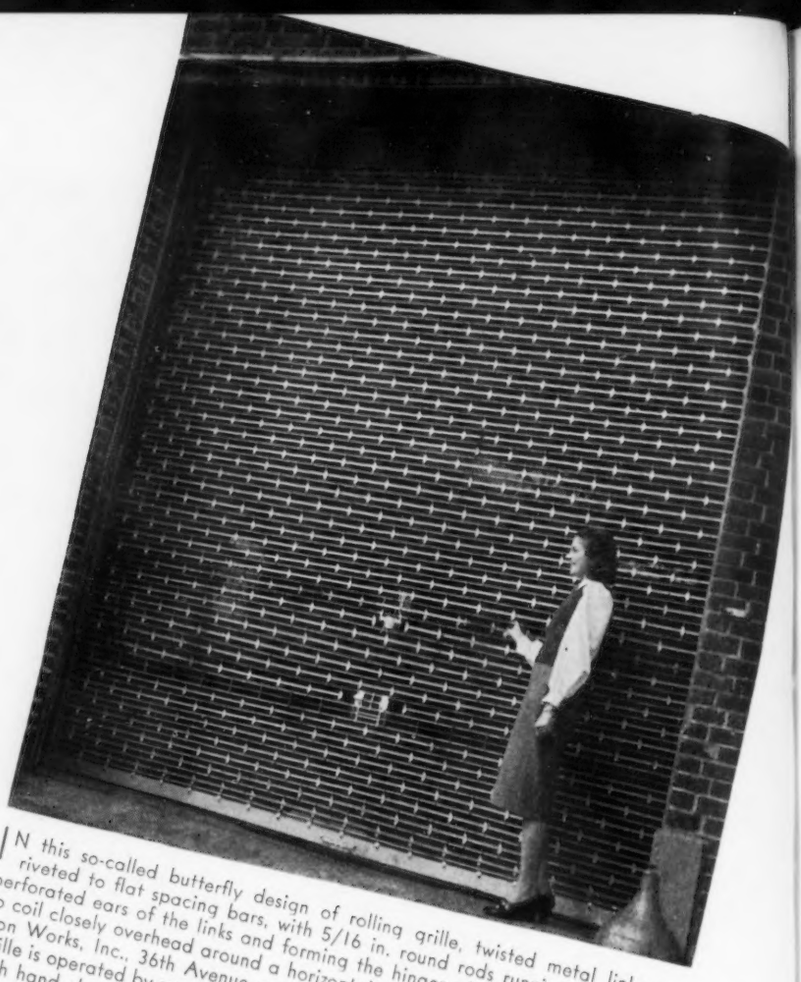


BARCO revolving flexible ball joints are used to supply steam, gas or other fluids to a rotating drum or roll without leakage. The model shown with the syphon adapter is used when it is desired to feed two different fluids into the drum or syphon out condensate through the same opening. In the steel mill, these new joints are used for water cooling cold rolls, in which case the adapter is used for the spray pipes going into the roll. These joints are made by the Barco Mfg. Co., 1801 Winnemac Avenue, Chicago, in sizes from 1/2 to 2 in. Larger sizes are under development.



NO. 303 Super Duralite-50 safety goggle, recently added to the line made by the American Optical Co., Southbridge, Mass., has a non-rubber headband consisting of a spring and ball chain covered by a cloth sleeving. The chain prevents over extension of the spring, yet permits quick adjustment to head size. Eyecups are molded of a material that combines light weight with high tensile strength. They can be sterilized without harm. Lens regularly supplied are the 6.00 curve, clear Super Armorplate type.

LIKE other Burgess acoustical booths, this new model 204 booth has no door, but owing to its lining of special sound absorbing material, factory noises and disturbances are absorbed so completely that telephone calls can be made without interruption. Exterior of the booth is made of heavy gage black finished steel, and the sound insulation is protected on the interior by perforated steel facing. These telephone booths are supplied by the Burgess Battery Co., Acoustical Division, 500 W. Huron Street, Chicago.



IN this so-called butterfly design of rolling grille, twisted metal links are riveted to flat spacing bars, with 5/16 in. round rods running through the perforated ears of the links and forming the hinges which allow the structure to coil closely overhead around a horizontal pipe shaft. Made by the Cornell Iron Works, Inc., 36th Avenue and 13th Street, Long Island City, N. Y., the grille is operated by manual push up or pull down, and in sizes up to 125 sq. ft. with hand chain or hand crank. For larger sizes, electric motor drive is used. This design is made in galvanized steel, aluminum, bronze, nickel silver or stainless steel. Locking is accomplished by chuting two bars horizontally and fastening with a cylindrical lock.

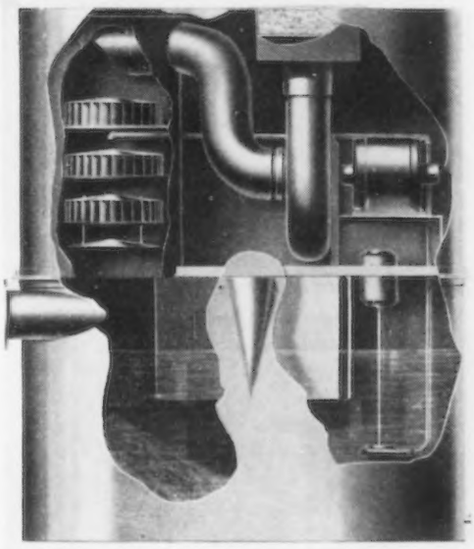
ARIDIFIERS for removing moisture and oil from compressed air and gas lines are now being made by the Logan Engineering Co., 4912 Lawrence Avenue, Chicago, in a complete range of standard pipe sizes from 3/8 to 10 in. Foreign matter impinges on a multiplicity of propeller blades revolving in opposite directions under the influence of the gas flow. The arrested contamination and moisture is collected in the lower housing from which it is drained.

PREFORMED fiber headgear which conforms to the contour of the back of the wearer's head is featured by the Mine Safety Appliances Co., Pittsburgh, in its new line of M.S.A. faceshields for protection against hot sparks, chemical splashes and flying grit. Headgear is adjustable in three ways. The full sparkshield model is shown. These faceshields are also furnished without sparkshield,. with semi-sparkshield and with a Comfo cap. Visor is a plastic material and is supplied in 4, 6 and 8 in. sizes, in green as well as in clear. Binding edge is aluminum. All parts are replaceable.

WHAT'S NEW IN PLANT SERVICE EQUIPMENT

M.S.A. 1-HR., back type, oxygen breathing apparatus employs the same principles of operation as the front type oxygen breathing apparatus produced by the Mine Safety Appliances Co. but differs in cover and harness arrangements. The apparatus is protected by a reinforced aluminum cover. It is furnished with either a mouthpiece as shown or with a Kops full facepiece. This back-type equipment is useful wherever use of the regular front-carry machine is hampered by special conditions requiring work in a prone or stooping position. Weight of the back-type apparatus is 24 lb.

FOR general maintenance painting, the Electric Sprayit Co., Sheyboygan, Wis., is marketing the new series 500 paint spraying units shown, featuring a twin cylinder, diaphragm type compressor driven by either a ½-hp. electric motor or a ⅝-hp. gasoline engine. Compressor displacement is 5.10 cu. ft. per min. and the spraying pressure is over 40 lb. The diaphragms, which positively seal off the crankcase, are said to last over 500 hr. The spray gun is of the pressure feed, internal mixing type, and is furnished with round and fan spray nozzles as well as an angle nozzle for spraying ceilings.



FOR the collection and disposition of dust and fumes arising from isolated operations or machines that cannot be tied in with a central dust collecting system, the Claude B. Schneible Co., 3951 W. Lawrence Avenue, Chicago, is supplying a line of midget portable Multi-Wash dust collectors in six small sizes of 300 to 1500 cu. ft. per min. capacity. Fouled air is drawn into a miniature scrubbing tower where foreign matter is impinged on a multiplicity of curved wet vanes arranged in several tiers. The washed air then passes to an entrainment separator to remove excess moisture and finally is delivered to the plant atmosphere through a metal wool diffuser and sound deadener. Sludge is washed down to a settling chamber.

DRAWERS and shelves are made of 18 gage steel finished in an olive green baked enamel on this Essco portable tool stand made by the Metal Products Division, Electric Service Supplies Co., 17th and Cambria Streets, Philadelphia. Stand top is 24 x 18 in. and is 32 in. above the floor. Bolts and domed type nuts are cadmium plated. Casters are 2½ in.

A NEW sight oil window affording improved visability through the use of a bright aluminum cup as a background is being offered by the Bijur Lubricating Corp., Long Island City, N. Y., for general use in connection with oil reservoirs, containers and lubricators. A self-contained unit, it is readily installed into a bored opening in the machine casting or part. Standard sizes of the window expressed in terms of the diameter of the reflector face are ¾, 1 1/16 and 1 5/16 in. A special assembly tool is provided.

THIS WEEK ON THE ASSEMBLY LINE

o o o

By W. F. SHERMAN
Detroit Editor

o o o

1941 model activity on tools and dies threatens to crowd shops with work . . . February nears production record, with 412,000 vehicles assembled; March estimated at 440,000 units . . . Educational orders in Detroit plants reduce strike threat . . . Warehouse makes novel use of steel "odds and ends" for packaging clip.

DETROIT—It's 1941 in Detroit even though it's 1940 to the rest of the world. This is the time of the year in which designers, engineers, master mechanics and many others in automobile plants have already forgotten the '40 models and are concentrating on what will be brought forth in 1941. So completely is their attention focused on 1941 that they unwittingly use that date on checks, letters and other documents. Actually, thinking is so completely transposed to 1941 models that only the sales department thinks of the 1940 models as a current product. That explains the denial by Nash that there will be an addition to the 1940 line of cars—the new line of light sixes, when it comes, will be part of the 1941 offering.

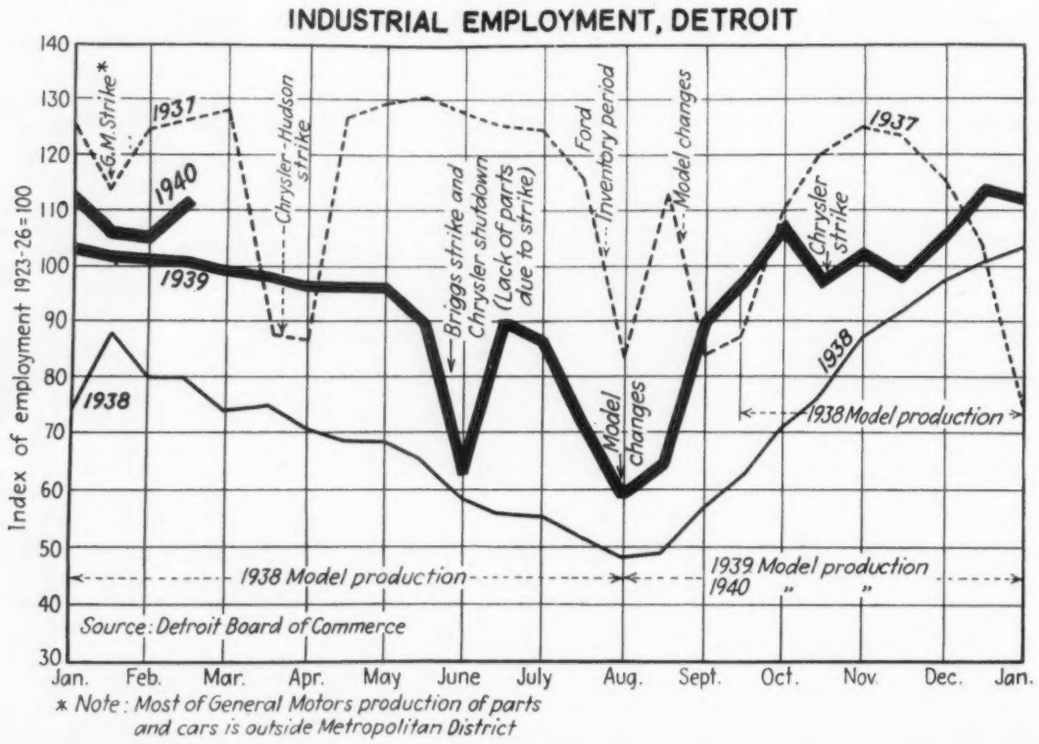
Sales departments and those responsible for getting out current production do not lead this ghostlike existence a year ahead of the commonplace world; they are concerned with the present. They have just completed another record-breaking month of production and are aiming at a high mark for spring sales. In the week just concluded the industry assembled 100,855 cars and trucks, winding up a month in which production reached the highest February level since 1929, according to Ward's Automotive Reports. This output was slightly lower than the previous week's 102,670, but still sharply above the corresponding period of a year ago, when the industry turned out 78,705 units. The decline was attributed to shutdowns of Packard and Willys-Overland to adjust schedules and balance stocks.

February Output 412,000

Schedules in 11 other plants in the industry were advanced, however. General Motors increased its total production to 44,490 from 43,455 the week before last. Chrysler plants increased volume to 26,375 from 25,865. Ford, Mercury, Lincoln-Zephyr and Chevrolet schedules were steady, but Plymouth showed a gain from 11,875 to 12,375.

The February output is estimated at 412,000 passenger cars and trucks, surpassed only by 497,705 units in February, 1929. Assembly of at least 440,000 units in March is predicted by Ward's statisticians.

Ahead lies an unexplored period during which business conditions could



ACCURACY

speeds up the modern kitchen

FAR cry from the old wood stove is the modern electric range. On the market now for several years, it was at first bulky, slow, prohibitively expensive . . . a luxury for a narrowly limited class of people. But today any of your neighbors could start right in to enjoy the cool, rapid cooking of the modern inexpensive, efficient electric range. Accuracy makes the difference, as it does in so many branches of human activity. Accuracy—machine tool accuracy to ten-thousandths of an inch at high speeds—has lowered costs, increased production, remade the civilized world.

There is no end in sight. At Pratt & Whitney today there are over 2,600 skilled craftsmen reaching out, by means of this principle of accuracy, to improve the world's status far beyond present standards. The machine tools, cutting tools, and gages P & W craftsmen make can often work wonders even in plants where production accuracy is already thought to be at its peak. When you buy, investigate Pratt & Whitney equipment. It pays big dividends.

PRATT & WHITNEY

Division **Niles-Bement-Pond Company · Hartford, Connecticut, U. S. A.**

conceivably move either way—up or down. Should sales fail to expand it would not be difficult to erase the present inventory of about half a million cars, although second quarter production would certainly suffer. On the other hand, should sales follow the upward trend, as they certainly are right now, second quarter production can continue at boom levels.

If conditions in Detroit are any criterion, we are already riding the crest of an important prosperity wave vouched for by business statistics issued by the Detroit board of Commerce. These figures deal with varied topics, such as the number of telephones and automobiles in use, number of gas, water and electric meters operating, residential building activity, savings deposits, etc. Industrial and commercial indices also were reported at their highest peak since 1929.

Die Shop Time "Spoken For"

The tool and die industry in Detroit appears to be headed toward its most "crowded" year. Already numberless blueprints have been released for quotations and some business has been placed. A somewhat critical condition apparently impends, with most of the die shop time already "spoken for" and a number of important programs not yet even tentatively "placed."

There is a possibility that some concerns will find their programs stymied as a result of a recent turn of events. First of all, the spurt in aircraft and other government work, and the tremendous strides taken by machine tool builders, have tied up the facilities of a great many tool and die shops throughout the nation. In recent years some of these shops have handled a lot of automotive work but they are now unable to work on automotive dies and complete them in time for 1941 models. At the same time, shops in and near Detroit have received sizable orders from outside, particularly from the aircraft industry.

Now the automotive die programs are ready for release, or nearly so. General Motors, with one of the biggest programs in years (virtually all of the body lines will be changed for next year) spoke early and revealed that it would place a greater percentage of its die work outside this year because its own shops would be unable to handle all of it. According to a practice prevalent in the automobile industry, GM has thus practically reserved the facilities and time of a number of shops.

Added to this is the fact that Nash, Hudson and Packard have stirred up a lot of interest by extraordinarily early inquiries which indicated that some of their suppliers of previous years would be unable to handle their die programs this year. At Chrysler there are indications that after-effects of the recent strike slowed down 1941 engineering and planning several weeks, so Chrysler will probably be trying to place die work at a period of peak activity. The spring peak will be accentuated by the probable placing of Ford work for the light six at the same time that Packard and Nash probably will be pressing work on additional cars to be put in their lines.

War Orders Light

Actual war orders in the Detroit area do not appear to amount to much so far, if considered on the basis of dollar volume or quantities to be produced. However, the number of orders placed—mostly on an educational basis—is difficult to estimate. So far the results seem to be: (1) the education of manufacturers; (2) a great restriction of plant visits; (3) many salesmen of tools, dies and equipment are finding that they must take estimators with them to the plants to give estimates because blueprints are not being released for that purpose; (4) employees are being quizzed on citizenship, and (5) talk of strikes is decreasing. So far, few of the orders have required the purchase of many machine tools or much equipment, although frequent reports that this or that firm has a new government order sends salesmen scurrying to the plants to check up.

Use of odds and ends of steel by a warehouse in Detroit can easily be labeled the "trick of the week." Less than six months ago, L. J. Epps, of Consumers Steel Products Corp., started work on a clip to protect corners of packaged steel. Instead of merely bending a scrap of steel to form a right-angle clip, Consumers designed a clip which is corrugated so steel bands or wire wrappings cannot shift their position and loosen the bundle. This Safe-T-Clip is made of 20 gage steel with holes for nailing it in place so it can be used for crating and other forms of packaging. Corners are rounded so water-proofed paper on bundles of steel is not cut or torn, even when steel straps are pulled up tightly. The clips are made in two sizes, to be used with ¾ in. steel bands or 1¼ in. bands. Blanks for these

THE BULL OF THE WOODS — BY J. R. WILLIAMS

clips are 2 x 3 in. and 3 x 5 in., respectively. Six months ago Consumers started using the clips in the warehouse; three or four months ago they were introduced to the trade. To date, 500,000 of them have been ordered by one steel company which has adopted them exclusively. It is estimated that 50 tons of odds and ends have been used up so far. The potential demand for these clips is estimated at 50,000,000 a year.

Steel Hat Block

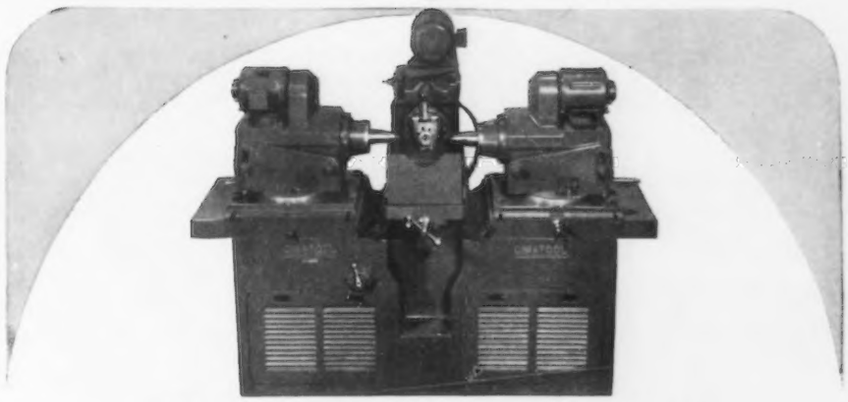
Not made of odds and ends, but equally interesting, is a hat cleaning device which this erstwhile steel warehouse is manufacturing and marketing. This consists of a "block" which is pressed out of steel strip. The "block" consists of an appropriately shaped steel helmet and a lower half which fits into it. These blocks are made in seven sizes which correspond with hat size. Blanks for these pressed parts are approximately 12 x 12 in., a little too big for using up odds and ends, but an ideal outlet for steel just the same. These are being merchandised directly to consumers along with a bottle of cleaning fluid and two cleaning pads. The "blocks" are nickle-plated, with a chrome-plated de luxe model for display counter use. Holes punched in the bottom plate permit the "block" to be hung on a coat hook with the hat pressed over it to preserve the shape of the hat.

Testing Materials Society Meeting at Detroit

THE American Society for Testing Materials is holding a spring meeting in Detroit this week (March 4-8). J. S. Worley, professor of transportation engineering at the University of Michigan addressed the banquet meeting Wednesday evening. Other speakers scheduled for the week included H. H. Morgan, president of the society, C. L. Warwick, secretary-treasurer, and T. A. Boyd, chairman of the Detroit District Committee, a member of the General Motors Research organization, who served as toastmaster.

Iowa Management Course

THE University of Iowa, Iowa City, Iowa, is offering a special three-week course (June 10 to 28) for people in industry interested in comprehensive training in motion and time study, waste elimination, cost reduction, and related subjects.



CHAMFERING GEAR TEETH

Is Now An Inexpensive Production Operation

CIMATOOL chamfering machines incorporate the principle that has finally combined flexibility with economy in gear tooth chamfering. Instead of presenting the tool to the work, Cimatool machines are built on the principle of presenting the work to the cutter, which rotates in a fixed position. This allows a heavier cutter spindle mounting and provides greater stability throughout.

Further, it permits the use of the hollowmill and pencil cutters as well as end mills and special cutters. Practically any type of chamfer is available from a regular wedge to any combination of circular arcs.

The work head incorporates all the mechanism necessary to the control of the machining operation. It is independently driven and its indexing movement is mechanically positive (always locked in mesh). Because of this construction it is not only quicker to set up but it provides higher production speeds.

The work gear spindle moves forward and backward in instant response to the rotation of a guide cam in the head assembly. The shape of this cam may be varied to provide any rate of cutting feed and in the case of pencil cutters an almost infinite variety of chamfers.

Cimatool

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THIS WEEK IN WASHINGTON

. . . House Committee is told Walsh-Healey Act should be repealed . . . Government buying through Procurement Division lags . . . TNEC may get steel industry monograph by mid-summer . . . House passes stream pollution measure.

o o o

By L. W. MOFFETT
The Iron Age

o o o

WASHINGTON — Representatives of the steel industry urged the House Judiciary Committee last week to turn thumbs down on three pending bills to tighten restrictions imposed by the Walsh-Healey Public Contracts Act. At the same time, Secretary of the Navy Edison told a press conference that the proposals might "seriously" affect the Navy's construction program."

H. S. Evans, executive vice-president of Central Iron & Steel Co., Harrisburg, recommended that the Walsh-Healey law be repealed by Congress, insisting that regulation of wages and hours under the Fair Labor Standards Act no longer makes administration of the public contracts law a necessary function of government.

Referring to the steel wage determination made by the Secretary of Labor in November, 1938, under which the department unsuccessfully attempted to subject steel mills in Eastern Pennsylvania to a 62½c. minimum wage, Mr. Evans warned the committee that if the pending steel wage case is upheld in the Supreme Court it will mean that small companies "will probably have to forego bidding on government contracts on account of the outrageously high wage rates which do not prevail in the territory at all."

Threat to Employees

The pending steel wage case likewise occupied a conspicuous place in the testimony of H. P. Bigler, director, Rail Steel Bar Association, of Chicago, who asserted that while the proposals to broaden the Walsh-Healey law are intended as a protection to the employee they may turn out to be "a potential threat to his earnings." Employees, he said, are far more concerned with receiving total earnings made up of reasonable wages, than they are with any "arbitrary rate per hour."

Expressing unqualified opposition to the three pending bills, he proposed that, if the law be revived, it be changed to clarify the meaning of the term "locality"—the center of controversy in the pending litigation involving the Secretary of Labor's steel wage decision. He also asked that Congress write into the law a provision recognizing cost differentials between small and large companies.

Broadening the law, proposals advanced by the CIO and the Department of Labor, would mean additional hampering of detail work for the Navy, said Secretary Edison. Advised at his press conference that some departments of government reportedly were splitting orders, bringing them outside the $10,000 limit in an effort to evade the law, Mr. Edison said he knew of no instances where such had been the case. He added, however, that he would put a stop to the practice if he found it to exist in his department.

Would Provide Blacklist

Briefly, the pending bills to tighten Walsh-Healey law would lower the existing $10,000 contract limit to $2,000 or $4,000; bring sub-contractors under the law for the first time; subject all shipbuilding contracts—in addition to Navy contracts which are already covered—to the law; and blacklist government contractors found by a court of final jurisdiction to have violated the Wagner Act.

That Congress will be reluctant to write into the law any blacklisting provision in view of revelations made by the special House committee investigating the labor board was indicated when Lee Pressman, CIO general counsel, told the committee that such a clause was a necessary part of any revision of the Walsh-Healey Act.

"There have been some severe criticisms against the National Labor Relations Board," declared Representative Emanuel Celler, Democrat of New York and chairman of the subcommittee. "We must weigh carefully any amendment of that character in view of what has happened within the NLRB."

Pressman Defends SWOC

Mr. Pressman, staunchly defending the board, insisted that newspaper stories differ from the testimony received by the special House committee, but Mr. Celler reminded the CIO spokesman that after reading the testimony he had concluded that "his experience with the board dovetails 100 per cent with what we read in the newspapers."

The CIO lawyer complained that many steel companies, which have refused to reorganize the Steel Workers Organizing Committee, receive the greatest volume of government awards. Said Mr. Pressman:

"The corporations with which the SWOC has contracts, and from which corporations we have gotten certain raises in pay and improvement in working conditions, those corporations are sacrificed in the sense of submitting bids to the government in that their bids are always higher than, or customarily higher than, those of the Bethlehem Steel Co., wich can afford to submit a lower bid since it pays lower wages."

French Steel Price Rise Affects Other Products

WASHINGTON — With all branches of the French iron and steel industry operating at maximum capacity, emphasis is being placed on the coordination of small enterprises which can be adapted to fit into the general production program. Reports to the Commerce Department are that a new price schedule on iron and steel products, effective Jan. 15, brought price increases for a number of finished products, including tubes, stamped metal and agricultural machinery.

BEAUTY AND THE BEAST

both benefit from new G-E Sunlamp!

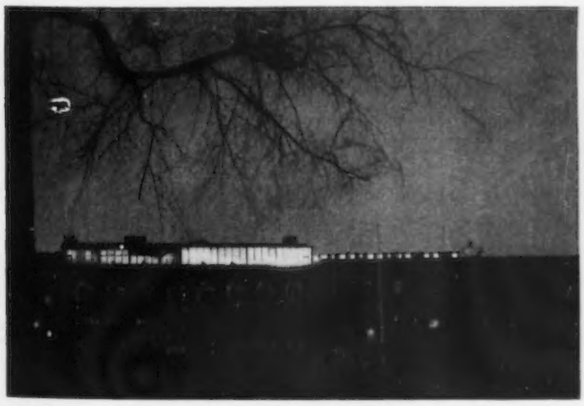
LADIES AND LITTLE PIGS both benefit from a new inexpensive G-E sunlamp, one of many new-type lamps recently developed by General Electric. Using scarcely more current than an ordinary 100 watt bulb, it provides three times as much ultra-violet as noon June sunshine. Tests show that ultra-violet speeds growth in pigs; cures rickets and builds sound bones and teeth in human beings.

LIGHT WHERE YOU WANT IT! New G-E MAZDA Projector lamp gives concentrated localized light where it's needed in shops and factories. A lens, reflector, and filament are combined in one complete hard-glass unit. New low price 150-watt size $1.40.

THE G-E Sunlamp described above is only one of more than 9000 different types and sizes of lamps that General Electric makes. Yet, as one of the many new developments from the General Electric research laboratories at Nela Park, Cleveland, it is an indication of the extensive research that is behind every lamp in the G.E. line.

Whether you run a factory or supervise some manufacturing process, General Electric can tell you exactly what kind of lamps you need to get the best possible kind of lighting.

Our research and experience in manufacturing all types of lamps has enabled us to make our standard G-E MAZDA lamps give more light every year for the same amount of current. How can G-E lighting service help *you?* Ask your G-E lamp man. General Electric Co., Nela Park, Cleveland, O.



DEATH CELL FOR LAMP BULBS is this G-E Lamp Development Laboratory, where enough G-E MAZDA lamps burn night and day to light a town of 4000. These life tests help assure the increasingly high standards set by G-E research and development . . . one of the reasons why G-E MAZDA lamps *stay brighter longer.*

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SILVERED BOWL
Hermetically sealed coating of mirror silver provides indirect light.

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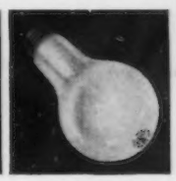
Like the G-E Mazda Projector lamp (above) but made of regular glass.

MERCURY H LAMP
A highly efficient, rugged, long-lived mercury lamp, well suited to industry.



100 WATT G-E MAZDA
lamps give 7% more light than 2 years ago, cost only 15c.

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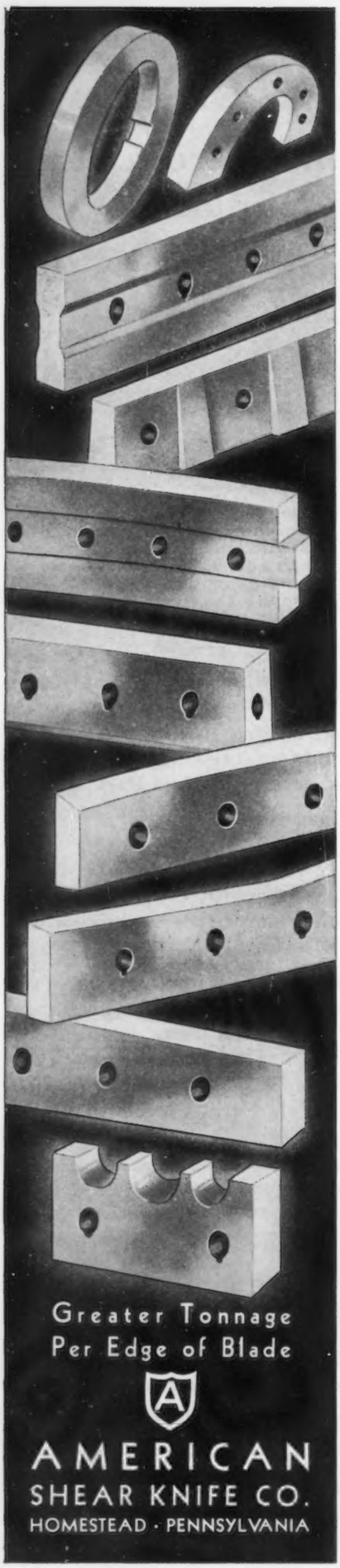
YEAR BY YEAR, BETTER LAMPS FOR EVERY PURPOSE



House Measure Tightens Water Pollution Control

WASHINGTON — New sources of water pollution, whether from the industrial waste of a manufacturing plant or the sewage disposal of a municipality, would be prohibited and the Federal Government empowered to abate the nuisance through court injunction under the stream pollution control bill which passed the House late last week. This enforcement provision, however, is expected to be stricken from the bill in conference before it is sent to the White House for signature.

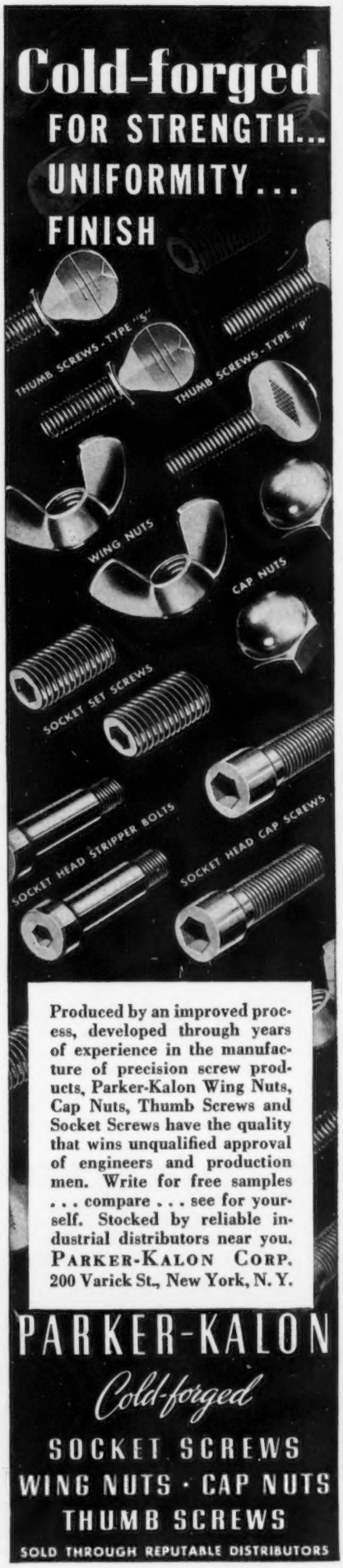
As passed by the House, the bill contemplates two steps: 1. A comprehensive study of the pollution problem to determine methods for procedure; 2. The encouragement to industries and governmental subdivisions to obtain RFC loans for instituting anti-pollution projects. The Public Health Service, the proposed administrative agency, would establish a division to classify the navigable waters into sanitary water districts. The measure appropriates $250,000 for Federal administrative costs.

Labor Department Issues New Apprentice Ruling

WASHINGTON—Manufacturers seeking to employ apprentices at less than the minimum wage rate prescribed by the Fair Labor Standards Act hereafter will be required to petition their state apprenticeship council or the Federal Committee on apprenticeship under revised regulations adopted by the Labor Department's wage and hour division.

The term "apprentice" is defined by the regulations to mean a person at least 16 years of age who is employed to learn a skilled trade pursuant to the terms of a written apprenticeship agreement. Under this agreement, not less than 4000 hr. of reasonably continuous employment is permitted and the apprentice is assured of participation in an approved schedule of work experience through employment, and at least 144 hr. a year of supplemental instruction related to the trade.

After approval of an apprenticeship agreement, the wage-hour administrator issues a special certificate under which apprentices can be paid at a rate less than the prescribed minimum wage for a definite period specified in the agreement.



Union Can't Sue Employer For Contempt, Court Rules

WASHINGTON—It is for the National Labor Relations Board and not a union to bring suit in a circuit court of appeals to have an employer adjudged in contempt for failure to comply with a court decree to enforce an order of the board, as modified.

Delivered by Chief Justice Charles E. Hughes, a Supreme Court opinion Feb. 26 affirmed a ruling of the United States Circuit Court of Appeals for the second district which denied a petition asked by CIO's Amalgamated Utility Workers to have the Consolidated Edison Co. and its affiliated companies adjudged in contempt for failure to comply with certain requirements of the court's decree to enforce a board order. The Circuit Court denied the application upon the ground that the union had "no standing to press a charge of civil contempt, if contempt has been committed."

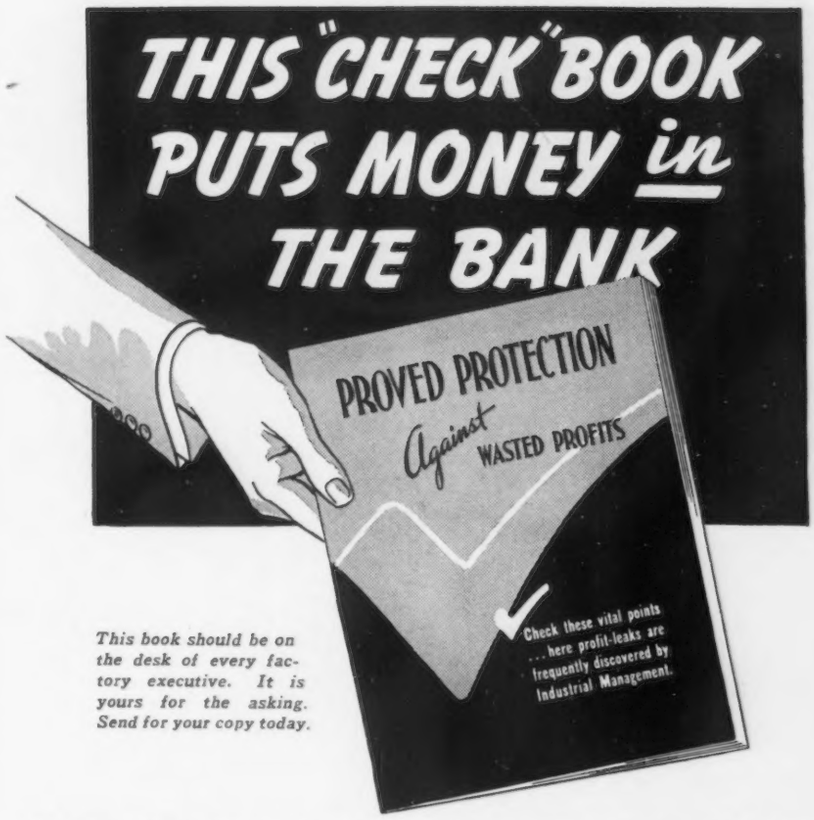
Meanwhile, the court has granted a writ asked by the Apex Hosiery Co., Philadelphia, for a review of the action of the third Circuit Court of Appeals in setting aside a judgment by a Federal District Court awarding the company triple damages of $711,-932 from the CIO - American Full-Fashioned Hosiery workers under the Sherman anti-trust law in connection with a sit-down strike in 1937.

Employment Record Requirement Liberalized

WASHINGTON — The requirement under the Fair Labor Standards Act that employment records of manufacturers with operations in more than one state be maintained in each state has been relaxed by the wage-hour administrator to permit the keeping of records at a central accounting office. Additional "abbreviated records" now are required at each place of employment, but merely have to show an employee's name, address, occupation, total hours worked and total wages paid.

New Tin Study Planned

WASHINGTON—Pending on the House calendar, as a result of action by the House Rules Committee, is a resolution which would authorize the House Foreign Affairs Committee to review and bring up to date its previous report on tin in view of the "present dangerous dependency of the United States" upon foreign sources.



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"That's because we equipped our machines with individual Texrope V-Belt Drives. They're behind those guards . . . quietly doing their jobs. We don't have to worry any more about belt hazards . . . or noise, either.

"The boss tells me we knocked our production costs to a new low. I'm proud of that . . . for I'm the one that suggested Texrope Drives when the boss suggested lower costs."

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That's the ***right*** idea industrial men in thousands of industries are getting today. And it's the idea that's behind the sensational rise of Texrope V-Belt Drives to number one position as the most popular way to transmit power to a machine!

Texrope Drives are modern drives . . . built to fit into modern manufacturing methods that demand better products at lower costs. Check into their engineering advancements. See how you can go after ***extra*** profits ...in your plant...with Texrope Drives! Texrope Division, Allis-Chalmers, Milwaukee, Wis. A 1195

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SHORT CENTERS FOR SPACE SAVING. Texrope V-Belt Drives allow you to put your source of power close to the machine being driven. There's no waste space . . . no unsightly shafts to keep out light.

INDIVIDUAL DRIVE PRINCIPLE CUTS POWER COSTS. When each machine has its own drive, you only pay for power costs when it is producing. In contrast . . . where a group of machines is coupled to a line-shaft . . . only one might be running . . . but power used is out of proportion to actual needs.

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SHOCK-PROOF FEATURE PROTECTS MOTOR AND MACHINE. Texrope Drives do not vibrate . . . actually absorb shocks even when the load is a pulsating one. Lower belt pull means longer bearing life . . . less service and maintenance costs.

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T TRANSMISSION COSTS

Steel Monograph for TNEC May Be Ready by Mid-Summer

WASHINGTON — The monograph on the steel industry which will be submitted to the Temporary National Economic Committee will be prepared by Prof. M. G. de Chazeau of the University of Virginia. Dr. de Chazeau, as an attache of the Department of Justice, was in charge of economic studies of the industry for the government which were presented at the TNEC hearings.

Dr. Theodore J. Kreps, economic consultant for the committee, who is supervising the preparation of the numerous monographs which will be presented to the committee, said that he expects the one relating to the steel industry to be completed about midsummer or late in the summer. Like other monographs it will carry recommendations. Before it is finally submitted to the committee the draft being prepared by Dr. de Chazeau will be passed upon by A. H. Feller, in charge of the Department of Justice steel hearings, and commented upon by the Federal Trade Commission. The opinions of some 15 steel executives and steel industrial journal editors will be asked.

It was stated that comment is desired for possible corrections or revisions of the monograph and to make the monograph as comprehensive as possible by reflecting various views. It was stated that, regardless of whether it develops alterations in the original draft and recommendations, the comment will be given recognition in the monograph.

Responsibility for the monographs will rest with the different government executive agencies which submit them to the TNEC for whatever consideration and disposition the committee cares to make of them. Since there will be a large volume of reports and recommendations it is to be expected that some will while others will not find their way in the committee report and legislative recommendations to be made to Congress.

Underlying the study of the steel industry were such questions as concentration of economic power, costs, prices, distribution, the basing point system, location of plants and their availability to raw materials and consuming markets, so-called domination of larger units over smaller companies, efficiency as related to size, and the elasticity of demand and its effect on prices.

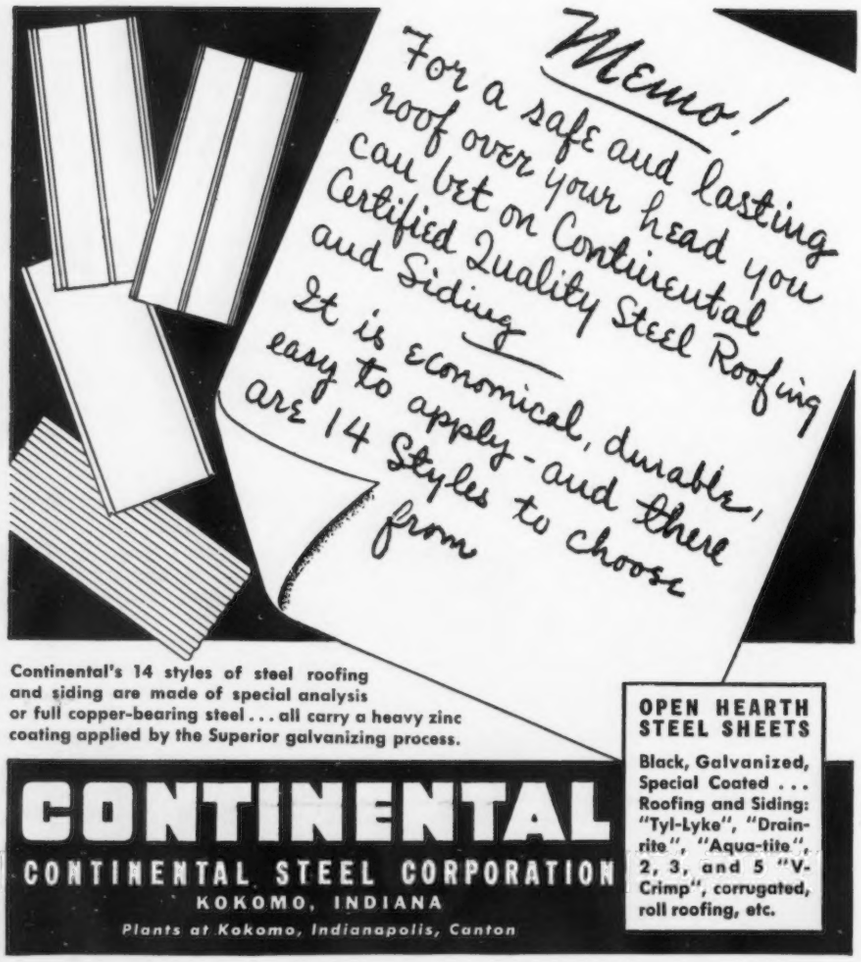
Dr. de Chazeau, co-author of "The Economics of the Iron and Steel Industry," in testifying before the TNEC, made only one recommendation, and it was sharply challenged by Senator King, Democrat of Utah, as providing for bureaucratic control of industry, a charge that Dr. de Chazeau denied. He proposed establishment of a permanent federal agency to collect prices, sales, costs and investment information from basic industries. The purpose of the agency, Dr. de Chazeau said, would be to derive "criteria of desirable and possible price changes" and to coordinate the work with other governmental agencies concerned with public utility investment schedules and central banking policy.

Justice Department Neutral

Displeasing to the FTC, zealously committed to an f.o.b. mill price system, Dr. de Chazeau, in an analysis of a study on steel prices and distribution, said that "the basing point formula of prices seemed to be honored more in the breach than in the observance" during February, 1939, the period covered in the study. The Department of Justice took no stand either for or against the system.

Only general conclusions, and no recommendations, were arrived at by Dr. de Chazeau, but it was notable, in view of attacks on the rigidity of prices, that he discussed price cutting in the products which the study considered. He said that many important steel producing areas would have to curtail production sharply if all consumers were supplied by the steel company nearest to them and at another point declared that competitive forces determined the prices quoted at all destinations.

Meanwhile, preparations are being made for a TNEC hearing with regard to the impact of technological developments on labor. The hearing has been tentatively set to begin on April 8 and probably will last two weeks. Research work on the subject is in charge of Dr. H. Dewey Anderson, assistant to Dr. Kreps. Views of employers,



Continental's 14 styles of steel roofing and siding are made of special analysis or full copper-bearing steel . . . all carry a heavy zinc coating applied by the Superior galvanizing process.

OPEN HEARTH STEEL SHEETS

Black, Galvanized, Special Coated . . . Roofing and Siding: "Tyl-Lyke", "Drain-rite", "Aqua-tite", 2, 3, and 5 "V-Crimp", corrugated, roll roofing, etc.

CONTINENTAL

CONTINENTAL STEEL CORPORATION

KOKOMO, INDIANA

Plants at Kokomo, Indianapolis, Canton

employees and consumers are to be presented. Philip Murray, SWOC chairman, noted for his complaint about the continuous mill, will testify. Steel manufacturers as well as steel consumers also will be called as witnesses, the purpose being to go into the subject in all its phases.

Buying Through Procurement Division Still Lagging

WASHINGTON — Despite a White House order of last June, which directed all government departments except War and Navy to henceforth make all purchases through the Treasury Department's Procurement Division, the latter agency has not increased its buying volume appreciably. Lack of funds and other difficulties have so far prevented even a gradual change in the Government's buying habits.

Since its creation the Procurement Division—centralized government purchasing agent since 1933—has been doing the buying for all departments in Washington except War, Navy, Post Office, Agriculture, Interior, and in the field on a few special items. Under the shift contemplated in the President's order, all non-military purchases will eventually clear through the central buying agency.

After gingerly fingering its new duties for eight months, the Procurement Division has asked the Budget Bureau to approve an initial step in the program, which contemplates a slight shift in buying by allowing certain departments to continue purchasing items usually procured under term contracts and those purchased in the open market on which the value does not exceed $100. The Budget Bureau has circularized all departments in an effort to learn what the shift will involve in the way of shifting expenditures.

In the meantime, Secretary of the Treasury Morgenthau is understood to have sent five trouble shooters to the Procurement Division in an effort to streamline its procedure, cut red tape, and make it more than a nominal division of his department.

USHA Steel Requirements

WASHINGTON — The United States Housing Authority estimated this week that its $770,000,000 low-cost housing program will require 275,000 tons of structural and reinforcing steel, 500,000 steel windows, and 2,000,000 lb. of sheet metal.

THE LANDIS
14" x 48" Type C
Hydraulic Universal
Grinding Machine.

LYING HIDDEN in your factory may be an enemy of production and profits as ruthless and deadly as the snake pictured above. This enemy, obsolete equipment, can strike without warning and send costs mounting, or it can slowly squeeze the lifeblood from your firm by cutting into profits. Obsolete equipment means the loss of valuable time. The more quickly a job can be done, the less it costs—the less it costs, the greater the profit. ◆ For instance, a certain milling machine manufacturer figures a 10% depreciation on his machine tools and actually makes replacements every ten years. This company was requiring a total of 4620 minutes to grind 13 different spindles—all to an exceptionally fine finish and a close degree of accuracy. Landis guaranteed to reduce the time on these to 2770 minutes, a reduction of 40%. After installation, the new Landis 14" Type C Hydraulic Universal actually reduced the time to 1533 minutes or 66%. ◆ Waste no time in getting rid of those dangerous obsolete machines that bog down production. Investigate, invest in Landis, and watch your profits soar. No. 317

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LANDIS TOOL COMPANY WAYNESBORO PENNSYLVANIA

Government Orders

WASHINGTON — Government contracts for iron and steel products, as reported by the Labor Department's Public Contracts Division for the week ended Feb. 24, totaled $601,165. For non-ferrous metals and alloys contract aggregated $52,423; for machinery $150,153; for transportation equipment $1,040,505. Details follow:

Iron and Steel Products

York Safe & Lock Co., York, Pa., War Ordnance, cradle assey 57,050

James Cunningham Son & Co., Rochester, N. Y., War Ordnance, carriage assey $62,856

The Lamson & Sessions Co., Cleveland, War Ordnance, carriage bolts 25,816

Central Iron & Steel Co., Harrisburg, Pa., Panama Canal, steel, plate ... 12,334

The Colorado Fuel & Iron Corp., Denver, Panama Canal, structural steel 16,926

Noland Co., Inc., Washington, D. C., Panama Canal, steel pipe 29,870

The Lewyt Metal Products Co., Brooklyn, N. Y., War Engineer Corps, cable reels 14,014

Bethlehem Steel Export Corp., New York City, War QMC, steel bars... 57,759

United States Steel Export Co., Washington, D. C., Panama Canal, steel plates 41,010

American Chain & Cable Co., Inc., York, Pa., War Air Corps, jack assemblies 28,882

Blackhawk Mfg. Co., Milwaukee, War Air Corps, jack assemblies 36,012

American Steel Foundries, Chicago, War Ordnance, steel castings 141,837

Lukens Steel Co., Coatesville, Pa., Boston Navy Yard, steel plates 30,880

American-LaFrance-Foamite Corp., Elmira, N. Y., War Air Corps, cylinder assey, oxygen 19,274

Standard Pressed Steel Co., Jenkintown, Pa., War Ordnance, eyebolt lifting plugs 26,640

Non-Ferrous Metals and Alloys

Scovill Mfg. Co., Waterbury, Conn., War Ordnance, fuze sockets $13,785

Lewin-Mathes Co., East St. Louis, Ill., War Ordnance, copper ingots 13,968

Aluminum Co. of America, Washington, D. C., D. C. Navy Yard, aluminum 10,000

Matthiessen & Hegeler Zinc Co., LaSalle, Ill., Post Office, ribbon zinc 14,670

Machinery

Baldwin-Southwark Corp., Eddystone, Pa., Interior Recl., turbine and governor $72,629

Singer Sewing Machine Co., New York City, War Air Corps, sewing machines 14,414

The Otis Elevator Co., Washington, D. C., War Engineer Corps, freight elevator 15,670

Marshall & Huschart Machinery Co., Chicago, War Ordnance, gear cutting machine 10,400

Michigan Power Shovel Co., Benton Harbor, Mich., Panama Canal, truck cranes 18,960

Thomas F. Herzog Trading as Machine Tool & Die Co., Detroit, War Ordnance, presses 18,080

* * *

WASHINGTON—The Navy Department's Bureau of Supplies and Accounts has awarded contracts to these companies:

Curtiss-Wright Corp., Curtiss Aeroplane Division, Buffalo, spare parts for aircraft, $41,315; Consolidated Machine Tool Corp., Rochester, N. Y., engine lathes, $75,560; Collyer Insulated Wire Co., Pawtucket, R. I., cable, $6,831; General Cable Corp., cable, $12,502; Jessup Steel Co., Washington, Pa., corrosion-resisting steel, $12,179; Sharon Steel Corp., Sharon, Pa., corrosion-resisting steel, $13,742.

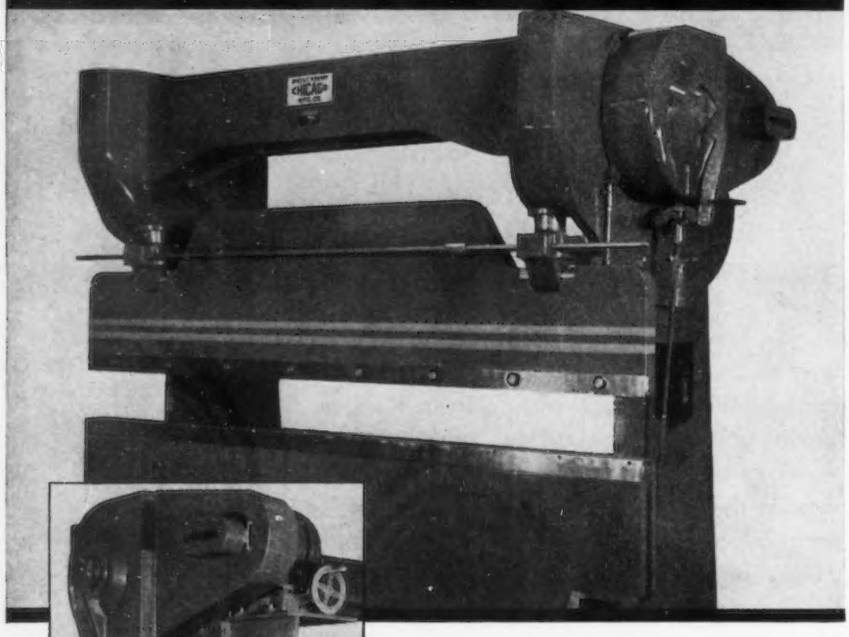
Gilbert & Barker Mfg. Co., Springfield, Mass., steel bodies, $12,814; American Tool Works Co., Cincinnati, engine lathe, $5,882; Northill Co., Inc., Los Angeles, folding anchors, $41,864; Tinius Olsen Testing Machine Co., Philadelphia, testing machine, $11,750; Lukens Steel Co., Coatesville, Pa., trunnion blocks, $46,637; Collyer Insulated Wire Co., Pawtucket, R. I., cable, $8,642; American Steel & Wire Co., of New Jersey, cable, $8,642; John A. Roebling's Sons Co., cable, Trenton, N. J., $8,382.

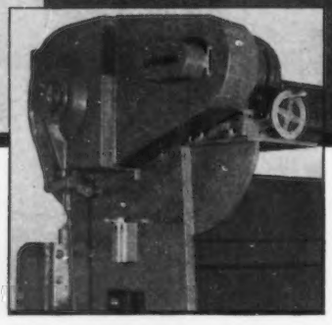
Merco Nordstrom Valve Co., Pittsburgh, plugs, cocks, $12,518; Youngstown Sheet & Tube Co., Youngstown, nickel steel, $24,558; Standard Machinery Co., Providence, R. I., machined and finished roller paths, $60,356; Machinery Builders, Inc., Long Island City, N. Y., towing carriage, $114,812.

Greece Adopts Import Quotas

WASHINGTON—In a move to relax wartime import restrictions, Greece has established import quotas for the first half of 1940 for a number of American commodities, including electrical appliances and supplies, hand tools, and scientific instruments. According to a Commerce Department report, a decision regulating the imports of motor vehicles is expected.

GREATER VERSATILITY
For Metal Working Machines





● Metal plates and sheets of many different gauges are bent and formed at highest production rate on this new light duty Press Brake because the manufacturer, Dreis & Krump Mfg. Co., standardly equips the brake with the REEVES Vari-Speed Motor Pulley. Hundreds of REEVES units have been used on these press brakes, giving universally satisfactory service.

Merely by turning a handwheel, the 50-ton capacity press may be varied from 15 to 45 strokes per minute, as required. This provides a versatility which gives this type of equipment many important operating advantages. REEVES Speed Control makes any good machine a better performer and a better money-maker in your plant. Installation of the *correct* unit to meet your individual needs is made easy by the wide range of units in the complete REEVES line. Nationwide engineering service. Write today for 122-page Catalog G-397.

REEVES PULLEY COMPANY, *Dept. I*, COLUMBUS, INDIANA

Reeves Speed Control

War Needs Turn Canada to U.S. Producers for Steel

TORONTO—Outpouring of war contracts to Canadian companies during the past few weeks has resulted in heavier demands on steel mills in this country to provide the necessary raw materials. With primary producers running at capacity to take care of old orders and new business, and with present facilities inadequate to provide all materials as needed it has become necessary for this country to turn to the United States for quick delivery. Particularly is this true with regard to plates and sheets, which are urgently needed here by shipbuilders who recently closed contracts in excess of $25,000,000 for anti-submarine and mine-sweeper craft.

Plans are under way to place orders with Canadian builders for merchant ships, extending demand for steel which will have to be imported. Machinery and equipment for industrial operations pertaining to war materials production also have come into big demand recently, and much of the equipment also of necessity has or will be obtained in the States.

Duty Removed

To facilitate and reduce the cost to consumers of iron, steel and equipment, the Canadian Government, by order-in-council, has removed the customs duty on materials imported for use in production of allied war contracts and also has removed the duty and sales tax on permanent and non-permanent plant equipment necessary to the carrying out of these orders, according to advice from the National Revenue Department.

Under the new proposal the remission or refund is made retroactive to Sept. 2, 1939. The new provision applies to all contracts made through the Canadian War Supply Board for Great Britain, its allies and British Dominions, but does not apply to materials to be used by Canada. Customs duty is removed from goods and materials to be used in manufacturing munitions, while customs duty and sales tax has been removed in respect to permanent and non-permanent plant equipment.

In connection with imports of plant equipment, importers must show: (1) that it is of a class or kind not made in Canada, and (2) that although available in Canada it is not procurable from Canadian manufacturers in sufficient quantities or within the time limits necessary to fulfill the contracts. Equipment on which remission or re-

Imports of Metal Working Machinery Into Canada, January, 1940

Classification	United States	United Kingdom	Total All Countries
Drilling and boring machines	$25,919	$6,182	$32,101
Grinding machines	71,392	6,158	77,550
Lathes	139,962	8,606	148,568
Milling machines	80,378	9,387	89,765
Planers	1,193	233	1,426
Presses	39,680	.....	39,680
Rolling mill machines	18,476	.....	18,476
Shapers and slotters	32,358	1,148	33,506
Not otherwise listed	192,511	36,641	230,142
Grand Totals	$601,869	$68,355	$671,214

Source: Dominion Bureau of Statistics.

fund of customs duty and sales tax have been secured shall, at the close of the war, be subject to duties and taxes at the rate then in effect or appraised values unless the equipment has been exported or destroyed.

Negotiate for Plates, Sheets

Negotiations are said to be under way for purchase of upward of 10,000 tons of plates and sheets from United States producers to be delivered as required over the present year, and this volume may be greatly increased as new shipbuilding awards are made to Canadian builders.

British Columbia shipyards will build 14 mine-sweepers to cost around $620,000 each. Contracts are being negotiated by the War Supply Board for approximately 1600 army trucks with the Ford Motor Co. of Canada, Ltd., Windsor, Ont., and the General Motors Co. of Canada, Ltd., Oshawa, Ont. Large contracts for airplanes also are pending. British Columbia shipbuilders to date have been awarded contracts for 24 steel vessels, representing outlay of approximately $15,000,000. This business includes 14 mine-sweepers and 10 submarine chasers, and will be constructed at yards at North Vancouver, Victoria, Esquimalt and Prince Rupert.

While preliminary work in connection with the British Columbia shipbuilding program has started, actual construction work cannot be started for about a month. Difficulty in obtaining deliveries of steel is said to be responsible for delay in starting work. It is stated that initial deliveries of steel will be from Pittsburgh, although subsequent supply may be obtained from Eastern Canada mills, depending on the speed with which the latter can make deliveries.

Boiler Contracts Awarded

Donald M. Service, general manager of the North Vancouver Ship Repairs, Ltd., stated that Vancouver Iron Works, Ltd., Vancouver, B. C., has been awarded a contract for construction of boilers for six mine-sweepers to be built by the North Vancouver firm for the War Supply Board, while the contract for engines has been let to Canadian Allis-Chalmers, Ltd., Toronto.

Announcement also is made of the awarding of contracts for 242 Westland Lysander army co-operative planes with National Steel Car Corp., Hamilton, Ont., at a cost of $6,875,000. Of this total 92 planes will be for delivery to the Canadian Government and 150 to the British Government. This is the first purchase by the British Government of Lysanders in Canada.

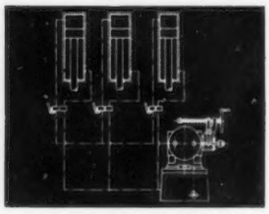
Orders placed by the War Supply Board, Ottawa, during the week were valued at $1,064,258, according to Transport Minister Howe. The largest individual order was for munitions and went to the Remington Arms Co., Inc., Bridgeport, Conn., valued at $175,766. Aircraft supplies orders were divided between Noorduyn Aviation, Ltd., Montreal, $47,286; Fleet Aircraft, Ltd., Fort Erie, Ont., $18,829 and Canadian Vickers, Ltd., Montreal, $10,843.

From official circles in Ottawa announcement is made that the British Government has consummated an agreement whereby it will take all the surplus production of aluminum that can be supplied by Canada.

Ordinary Business Gains

Local steel interests report further improvement in demand for finished

AN ADVANTAGE OF A-E-CO HELE-SHAW FLUID POWER



IF you are designing or building a machine in which many operations must be done in sequence or simultaneously, don't tie yourself down completely to traditional solutions.

For Hele - Shaw Fluid Power, from a Hele-Shaw Pump, may be by far the simplest, easiest and best answer to your problems.

Yes, it will position work for you, clamp it, feed work or tools, cease feeding, unclamp work, unload the machine or perform other operations at the same time or consecutively, and manually or automatically.

There's more to Fluid Power operations you'll like—the mechanical simplicity and dependability of it, for instance; infinitely variable speeds, flexibility of locating the Hele-Shaw Fluid Power Pump and precision control of pressures and speeds.

Hele-Shaw Fluid Power is smooth and resilient. But don't let smoothness or its cushioning effect deceive you, for Hele-Shaw Fluid Power packs a wallop of 3000 pounds per square inch.

With so many benefits for you and your customers, and many more, why not put Hele - Shaw Fluid Power to work now? Our own experts, from their experience with many applications, will gladly help you. Send us your problem today.

A-E-CO HELE-SHAW Fluid POWER

AMERICAN ENGINEERING COMPANY
2410 ARAMINGO AVENUE. PHILADELPHIA, PA.
Other A-E-CO Products: Lo-Hed Hoists, Taylor Stokers, Marine Deck Auxiliaries.

and semi-finished steel materials. While much of the new business is due to the big war contracts, ordinary domestic business also is responsible for increased demand for steel, and mills now are booking orders for delivery on some materials into third quarter. Seasonal improvement that usually comes in the spring is more pronounced than in other years, and covered practically all lines of primary steel production. Contracts just awarded to the Ford Motor Co., and General Motors Corp. of Canada, have brought out new inquiries for steel and other materials, while the automotive industry as a whole is buying more extensively than formerly.

While producers continue to quote current prices for sheets to the end of this month, they have made no provision beyond this date and contracts into second quarter are accepted with prices to be set at time of delivery. Prices generally are firm, and local steel interests do not look for immediate changes.

Merchant pig iron demand continues steady, but lacks special feature. Local blast furnace representatives look for increased forward delivery booking for second quarter, and also increased spot demand. Prices are firm and unchanged.

Priestley Lectures Scheduled

PENNSYLVANIA State College, State College, Pa., announces the 14th annual Priestley lectures, a series of five public lectures on "Physical Metallurgy in the Service of Industry," by Oscar E. Harder, assistant director, Battelle Memorial Institute, Columbus, Ohio. Titles and dates of the lectures are: March 11, "The progress of Physical Metallurgy," March 12, "Twenty Years of Physical Metallurgy of Exhaust Valve Steels." March 13, "Intermetallic Compounds and Their Importance in Industry," March 14, "Metals and Alloys in Dentistry," and March 15, "The Metallurgy of Bearing Steels."

Financial Notes

Worthington Pump & Machinery Co., Harrison, N. J., announces that its subsidiary, the Moore Steam Turbine Corp., Wellsville, N. Y., will hereafter be conducted as the Moore Steam Turbine Division of the corporation.

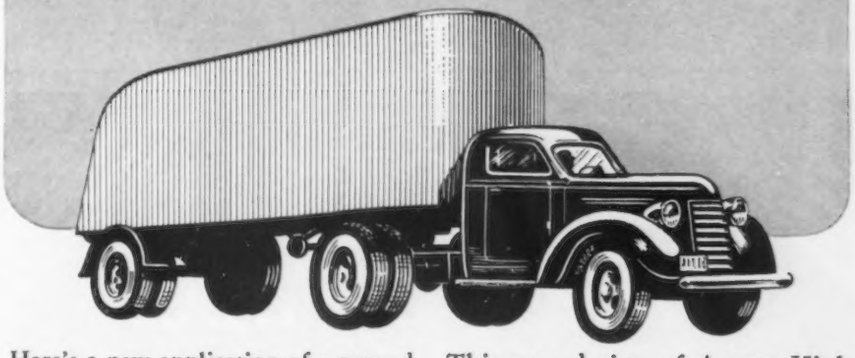
Empire Sheet & Tin Plate Co., Mansfield, Ohio, reports net profits of $39,141 for 1939. The company operated at a loss of $423,978 in 1938.

Bethlehem Hires 25,000 in 1939, Liberalizes 1940 Vacation Plan

TWENTY-FIVE thousand men were hired by Bethlehem Steel Corp. in 1939, increasing the company's payroll at the end of the year to 110,000, E. G. Grace, president, said this week in his annual report to employees. At the same time, he said, the employees' average working time increased 17 per cent and earnings averaged 91.6c. contrasted with 91.2c. in 1938.

"Though operations have receded somewhat from the peak of recent months, we still have a generally good operating schedule," the Bethlehem executive told employees. "With a

HIGH TENSILE *plus* CORRUGATION BOOSTS PAYLOADS



Here's a new application of a proved strengthening design that will save weight—and save money for you in the construction and operation of truck-trailers.

When they are used as beams, *corrugated* ARMCO High Tensile Steel Sheets make it possible in many cases to build sections with *only 50 to 65 per cent* of the weight of conventional types of construction. More weight-saving is made possible when similar sections are used as columns. This way you get rid of excessive weight and *save money* on materials.

This new design of ARMCO High Tensile Steel Sheets is based on a principle adopted by aeronautical engineers. Aircraft designers for some time have made use of corrugated sections as plane sheet stiffeners.

Would you like to know more about ARMCO High Tensile Steel—how this new and easy way increases payload even as it lowers construction and operating costs? For specific information mention your requirements when you write: The American Rolling Mill Company, 720 Curtis Street, Middletown, Ohio.

ARMCO HIGH TENSILE STEELS

ARMSTRONG

End Tool Room Jams with the right ARMSTRONG TOOL HOLDERS

● Every step-up in production, every change in models, every "new" product starts in the tool room with new tools, dies, jigs and fixtures. Too often when there is greatest urgency of speed the entire plant waits on the tool room. Yet these periodic and costly jams in the tool room are not entirely unavoidable, for with the correct ARMSTRONG TOOL HOLDERS you can step up speeds and feeds on all lathes, planers, slotters and shapers at will, for each ARMSTRONG TOOL HOLDER has sufficient strength and rigidity to stand up to speeds and feeds far beyond those customarily used . . . and will stand up to any cut the machine tool can pull.

The Armstrong System provides ARMSTRONG TOOL HOLDERS in over 100 sizes and shapes. Each is a permanent, multi-purpose tool that takes cutters quickly ground from stock shapes of high speed steel. Each is designed to give the most efficient cutting angle, the most convenient tool approach and the greatest tool clearance and excessive strength. With the correct ARMSTRONG TOOL HOLDER for each operation you are permanently tooled-up, ready to start work immediately at top speed with the most efficient tools available.

Build your Armstrong System and end costly jams in the tool room.

ARMSTRONG BROS. TOOL CO.

"The Tool Holder People"

309 N. Francisco Ave., Chicago, U. S. A.

Eastern Warehouse and Sales: 199 Lafayette St., New York

Buy ARMSTRONG TOOLS from your Supply House

ARMSTRONG TOOL HOLDERS Are Used in Over 96% of the Machine Shops and Tool Rooms

LEE

Quality Springs

ALL SHAPES · ALL SIZES · ALL MATERIALS

LEE SPRING COMPANY, Inc.

30 MAIN STREET BROOKLYN, N.Y.

LEE-BUILT TRADE MARK SPRINGS

large backlog of unfilled orders, a reasonable amount of new business will insure to us a fair basis of operations."

Industry in this country, he said, fortunately has not become geared to the uncertain demands of warring countries. The demands of war do not create prosperity. To whatever extent profits are made out of war activity, it is at the expense of legitimate commercial pursuits. I am sure that we all would like to see an early restoration of peace throughout the world, Mr. Grace said. The Bethlehem report listed the following figures as "facts every employee should know":

	1939	1938
Operating average ...	70.8%	43.3%
Average number, wage earners	95,029	82,680
Total wages	$158,489,941	$117,125,772
Average hours worked weekly	35.0	29.9
Taxes	$21,191,492	$13,183,148
Pensions	742,589	769,313
Plant improvements..	11,711,743	7,360,353
Net income	24,638,384	5,250,239
Earnings on investment	4.93%	1.88%
Earnings per common share	$5.75	None
Dividends on common	$1.50	None

In a breakdown of the $414,141,087 of "wealth created and distributed by Bethlehem in 1939," the report to employees gave these figures:

Received from the public	$414,141,087
Wages and salaries	158,676,161
Materials, supplies, expense	152,872,704
Inbound railroad freight	32,205,780
Depreciation, depletion	17,486,601
Interest paid	6,772,830
Taxes paid	21,191,492
Paid to stockholders	12,246,172
Balance retained	12,689,347

The Bethlehem report contained an announcement of a liberalization at cost of about $2,500,000 of the company's vacation plan: (1) The service requirement for one week's vacation with pay, heretofore five years, will be reduced to three years, to benefit the shorter service employees and (2) employees with 15 years or more service will receive a two weeks' vacation with pay instead of one week as heretofore. More than 10,000 employees have more than 15 years' service, the average for all employees being eight years, the supervisory forces 23 years and the 13 leading officials 32 years.

"Let us work hard to maintain our present prosperity," Mr. Grace told the Bethlehem employees. "Let it be no act of ours that slows up business. We know only too well what hard times mean. The experiences of the last ten years are still all too real. Certainly a profitless business cannot long survive."

AFL Member Sues Union, Asks $5,000 for Job Bias

MILWAUKEE—A suit for $5,000 has been filed in circuit court here by a former union member against the AFL Sheet Metal Workers' union. The workman claims he was discriminated against in job assignments. He alleges he was unemployed for a year while the union gave jobs to other members working on temporary union permits whereas his agreement with the union provided that jobs would be assigned in the order in which they signed the unemployment book.

Reich Finds Low Grade Copper Ore in Silesia

WASHINGTON — Low grade copper ore deposits have been found in lower Silesia, Germany, according to reports reaching the Commerce Department. Although preliminary prospecting has not been completed, the report said that the region may become the richest copper-mining district in the Reich.

Accelerated Plastics Test

WASHINGTON—Because of the growing use of transparent plastics for aircraft windshields, the Bureau of Standards has developed an accelerated aging test, of successive exposures of fog and ultraviolet light, making it possible to measure weather resistance and durability by laboratory methods in a few days instead of the months or years required under actual exposure.

889,000 More Unemployed Reported in January

THE total number of unemployed in the United States rose 889,000, or 10.6 per cent, in January, according to the regular monthly estimate prepared by the division of industrial economics of the National Industrial Conference Board.

$700,000 Power Unit Ordered

THE Allis-Chalmers Mfg. Co., Milwaukee, recently received an order from the Wisconsin Power & Light Co., for a 30,000 kw. hydrogen-cooled unit for installation in that company's power station near Sheboygan, Wis. The contract, which includes a condenser and auxiliary equipment, is said to total nearly $700,000.

LARGE STEEL CASTINGS

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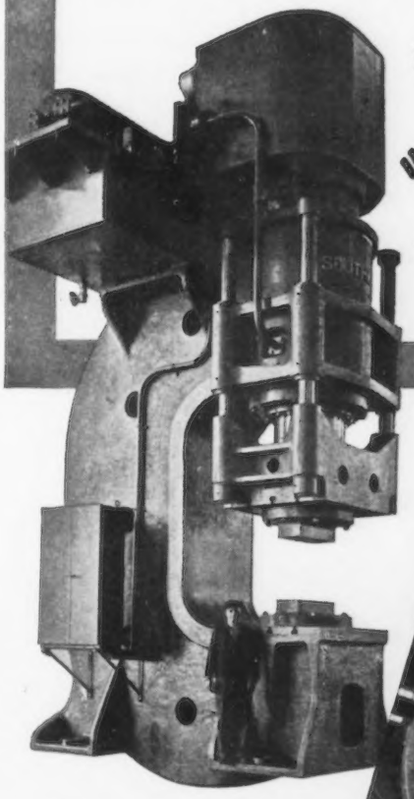


Cast steel runner for an I. P. Morris hydraulic turbine. Weight of casting about 45,000 pounds.

Cast steel housing for this Southwark forging press was produced by Standard Steel Works Company. Weight of casting about 129,000 pounds.

● Standard is equipped to supply steel castings of any size and shape to suit your requirements. The steel used is acid open hearth, produced in Standard's furnaces under close metallurgical control of a trained personnel. Standard's long experience is reflected in the high quality of its products.

CASTINGS • FORGINGS • WELDLESS RINGS • WROUGHT STEEL WHEELS

STANDARD STEEL WORKS CO.

THE BALDWIN GROUP

Subsidiary of THE BALDWIN LOCOMOTIVE WORKS

PHILADELPHIA

Hot Dip Galvanizers Hear Talks On Fuel, Fluxing, Other Topics

PITTSBURGH — When Lewis Nut & Bolt Co. at Minneapolis, Minn. decided to build a galvanizing pot to take care of its galvanizing requirements, considerable study was given the fuel question, W. G. Hartman of that company said at the annual meeting of the American Hot Dip Galvanizers Association, Inc., held at the William Penn Hotel here last week.

With the average cost of gas at Minneapolis 63.4c. per thousand cu. ft., the average cost on a per therm basis worked out to 7.92c. he said. A detailed study of fuel oil requirements disclosed a cost of 4½c. a therm. Accordingly, the company installed equipment which does not burn fuel oil as such, but, through a process of evaporation, gas is formed which is piped to the galvanizing pot burners.

The cost of fuel oil in Minneapolis, according to Mr. Hartman, averaged 6.2c. a gal. with a typical analysis as follows: Gravity, 40 to 43; flash, 170 deg. F.; viscosity, approximately 32; and sulphur, not more than 0.2 per cent. Using fuel oil, the cost of heating on overall average production ran 4.6c. a gal. or 28½c. an hour.

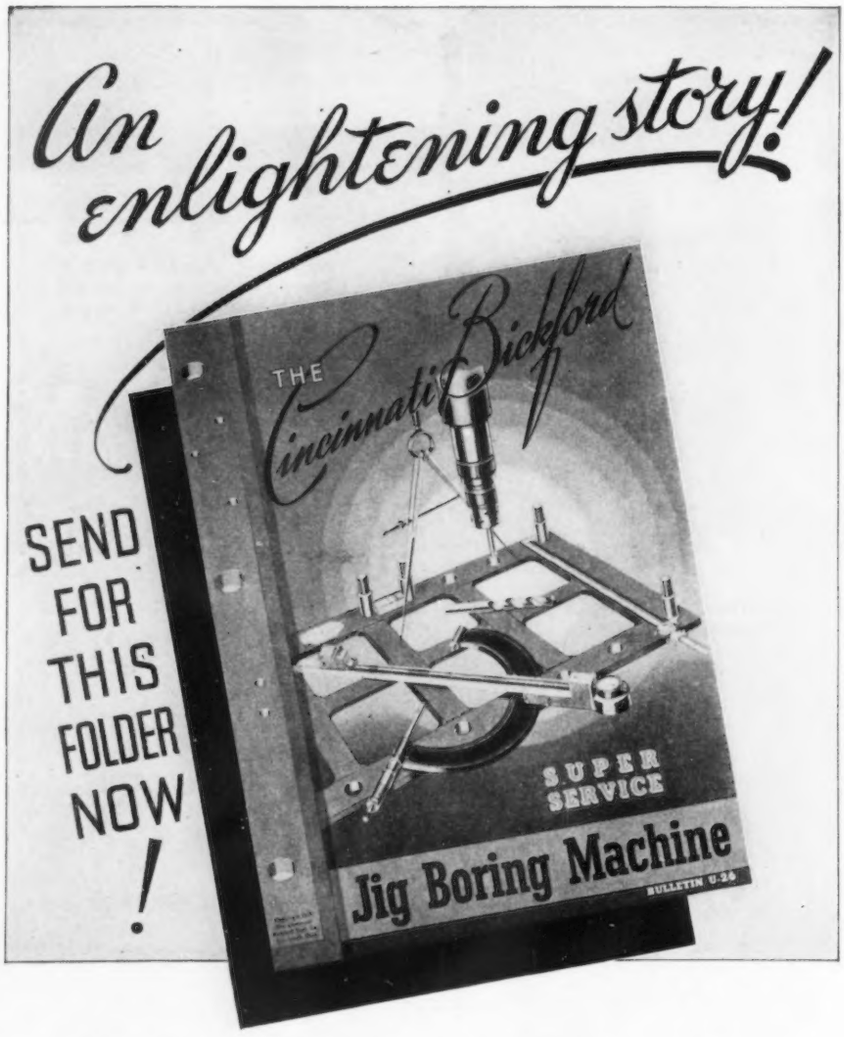
Galvanizing Plant Practices

A paper on the history of improvements in galvanizing plants and practices, authored by Nelson E. Cook, general superintendent of galvanizing operations, Wheeling Steel Corp., and initially delivered before the Iron and steel Engineers earlier this year, was read to the American Hot Dip Galvanizers Association by Stuart J. Swensson, secretary and treasurer. Mr. Cook's paper dealt primarily with the galvanizing of sheets and covered in detail various improvements in technique over the past several years.

Hot dip galvanizing of small bolts, nuts, and screws was discussed by C. H. Klein, development engineer, National Telephone Supply Co., Cleveland. The practice used in Mr. Klein's company is standard up to the time of removing the articles from the kettle. To secure clean threads, a centrifugal machine is utilized before quenching. Important in the use of this machine, Mr. Klein said, is the speed of starting, length of time, speed of rotation, and above all, skill in operation. Although various manufacturers might use different sized baskets, Mr. Klein said the peripheral speed at his plant in using the centrifugal machine approximated 2350 ft. a min. He mentioned that the bath for galvanizing small threaded materials was kept at a slightly lower temperature than for average production and approximated 830 to 840 deg. F.

Methods of Fluxing

Reporting on fluxing, Wallace G. Imhoff, technical director of research for the association, before presenting data on a suggested technique, exhaustively covered the history and application of the older methods, especially the use of muriatic acid. In discussing the suggested fluxing technique, Mr. Imhoff said that other questions were involved besides the change in the fluxing method, a fundamental one being, should the flux be acid, neutral, or alkaline in character. According to



Every plant manager who has or contemplates a tool room should know all about this brand new Cincinnati Bickford product.

It is the Super Service Jig Boring Machine which we had intended to show at the Cleveland Exposition last month. You can see it in full detail in this new bulletin which we will gladly send, without obligation. Merely ask for Bulletin U-26.

THE CINCINNATI BICKFORD TOOL CO.
OAKLEY CINCINNATI OHIO U.S.A.

the author, the best results are obtained when the zinc-ammonium-chloride solution is slightly acid because it tends to keep all oxides and basic zinc salts dissolved. The solution of zinc-ammonium-chloride is held in either a wooden or acid-proof brick tank and should be heated with enclosed steam coils. The saturation of the solution, Mr. Imhoff said, depends on the production, surface area, kind of work, and operating conditions. The practical way, he said, of telling if the solution is correct is by watching the surface of the work on the drier. If it comes out a clean black or grey color with a salt glaze on after drying, conditions are about right.

In summing up the requirements of the suggested flux technique, it was said that the iron surface must be cleaned perfectly by pickling, iron salts in the pickling solution should be entirely eliminated through rinsing in running water, and the iron surface, once made clean, must be kept that way until it is in the molten zinc bath.

J. & L. Strip Mill Inspected

Mr. Swensson also reported progress being made on a study of various Federal governmental department specifications with respect to rust resistance and prevention. F. M. Carlson, American Tinning & Galvanizing Co., Erie, Pa., presented a report on embrittlement of malleable iron castings. General discussions on accumulation of dross, double hot dip galvanizing, etc., were shared by various members.

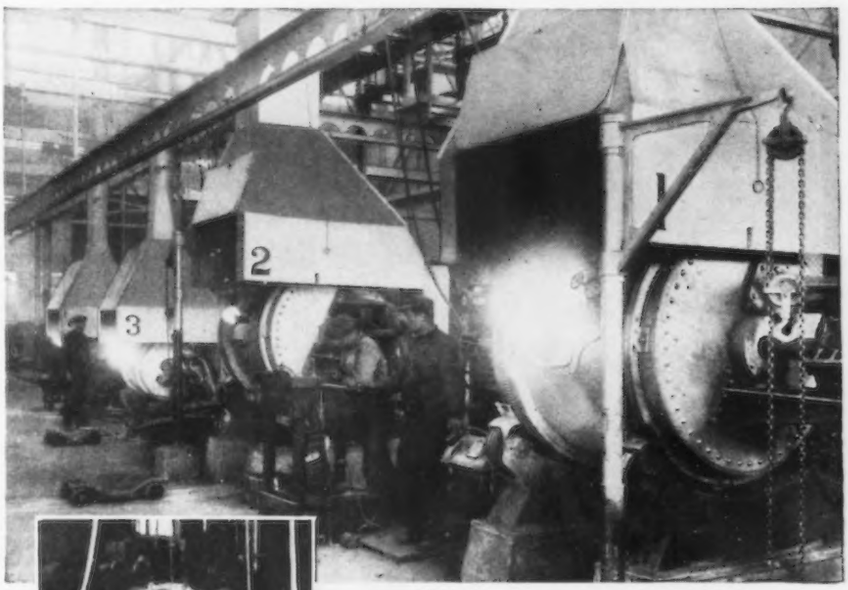
On the second day of the meeting, members were conducted through Jones & Laughlin Steel Corp.'s hot and cold strip mill.

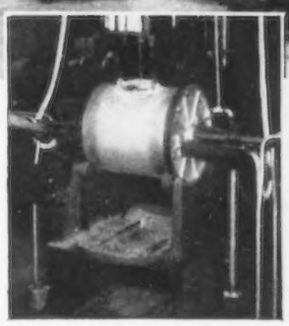
Officers elected at the American Hot Dip Galvanizers Association, Inc., meeting last week are: President, A. J. Blaeser, Joslyn Mfg. & Supply Co., Chicago; 1st vice-president, F. P. Auxer, National Telephone Supply Co., Cleveland; 2nd vice-president, Phelps Ingersoll, Wilcox-Crittenden & Co., Inc., Middletown, Conn.; secretary and treasurer, Stuart J. Swensson, American Bank Bldg., Pittsburgh. Directors are as follows: I. M. Herrmann, Acme Galvanizing Co., Milwaukee; A. J. Blaeser, Joslyn Mfg. & Supply Co., Chicago; F. P. Auxer, National Telephone Supply Co., Cleveland; T. M. Gregory, Hanlon-Gregory Galvanizing Co., Pittsburgh; J. B. Tate, Witt Cornice Co., Cincinnati; Phelps Ingersoll, Wilcox-Crittenden & Co., Inc., Middletown; Clem Stein, International-Stacey Co., Columbus, Ohio.

Birmingham Foundrymen Hear Gov. Dixon Describe South's Ills

PAST attendance records were shattered at the 8th annual foundry practice conference held by the Birmingham Chapter of the American Foundrymen's Association on Feb. 22, 23 and 24 at the Tutwiler Hotel, Birmingham. Registration was 704, a figure said to exceed that reported for any similar conference ever sponsored by a chapter of A.F.A.

A feature of the conference was an address by Frank M. Dixon, governor of Alabama, at the Friday evening banquet. Gov. Dixon spoke on "The Importance to the Nation of the Solution of the Economic Problems of the





An Accurate Metallurgical Tool Geared to Big Time Production

Because each heat in a Detroit Rocking Electric Furnace can be controlled accurately as to analysis and metallurgical results, research and experimental laboratories have for many years used small capacity Detroit Furnaces for their melting operations.

The same melting characteristics used for technical research may be duplicated in commercial production with a Detroit Rocking Electric Furnace now available in capacities up to 8,000 pounds.

To the jobbing or production foundry a Detroit Furnace means flexibility—large or small quantities of any ferrous or non ferrous metals may be run economically. It means producing the best composition for any product, a uniformly superior product and a higher percentage yield of perfect castings. It means satisfied customers for you and repeat orders—ask the man who uses one.

DETROIT
ROCKING ELECTRIC FURNACE
DIVISION OF KUHLMAN ELECTRIC CO., BAY CITY, MICH. AGENTS IN 40 CITIES

South.' He reviewed the South's struggle and its paramount value to the nation as a self-sustaining unit of the country. R. C. Harrell, Stockham Pipe & Fittings Co., presided at the banquet, while W. D. Moore, American Cast Iron Pipe Co. acted as toastmaster.

The conference's technical meetings were opened by an address by W. W. Rose, Gray Iron Founders' Society, whose subject was "How Do you Sell Your Castings?" Mr. Rose attributed some of the industry's economic problems to the fact that the business end of foundries had not kept pace with technical and production developments. The solution to these problems, he felt, laid in educating buyers as to the true characteristics of gray iron and competing on a performance basis, rather than a price basis. Mr. Rose recommended such practices as the "open house," group advertising and the refusal to sell below a cost which would not net the producer a profit.

Standing Down! The man in the center is held suspended only by magnetic attraction for metal in his shoes; others hang to magnetically attracted metal bar.

WHEN the illustration above was first shown as a visual demonstration of the tremendous pulling power of a Dings *High Intensity* Magnetic Pulley, it was captioned "Dings Builds The Most Powerful Pulley on the Market size for size!" THAT STATEMENT IS STILL TRUE!

The Dings air-cooled Pulley gives you greater magnetic pulling power, GREATER IRON-REMOVAL POWER, than any similar unit, because only the Dings Pulley has *bronze* spacer rings instead of steel — steel short-circuits lines of force, weakens magnetic pull. *And*, because heat destroys magnetic pulling power, Dings has twice the heat-radiating surface of other pulleys. *Good reasons why the Dings Pulley is more powerful.*

Think of that extra power in terms of cleaner foundry sand—elimination of sprues, risers, gates and shot iron —think of it in terms of faster, lower-cost sand conditioning and better castings and you'll see that a new Dings Pulley will pay for itself in *your* plant. Right now is the time to write for literature and recommendations.

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HIGH INTENSITY

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LIFTING MAGNETS • MAGNETIC CLUTCHES • SEPARATORS

At the Thursday luncheon meeting, L. N. Shannon, Stockham Pipe Fittings Co. and president-elect of the A.F.A., spoke on "The Value of the American Foundrymen's Association to the Foundry Industry." W. O. McMahon, Sloss-Sheffield Steel & Iron Co., presided at this meeting.

"Safety in the Foundry" was discussed by Warren Whitney, National Cast Iron Pipe Co. Mr. Whitney pointed out that the average foundry worker's chances of being hurt at work are about 1½ to 1, compared with the average worker in other industries, but if the foundry worker is hurt it will be only about half as serious as if he worked with the average group of industrial workers. The speaker said he felt progress was being made toward making the foundry safer, but thought a greater amount of safety engineering and education would hasten that progress.

"Off Grade Cast Iron" was discussed by V. A. Crosby, Climax Molybdenum Co. Mr. Crosby's opinion was that all raw materials entering a charge should be subjected to the same degree of suspicion and criticism as pig iron customarily receives. He said he had always found it possible to estimate the quality of pig iron largely on the basis of chemical analysis, a yard stick not too difficult to obtain and use. A number of case histories of off grade iron and the cause of the undesirable characteristics were cited by Mr. Crosby.

Steel Corp. Film Shown

Other papers read at the meeting included "Foundry Personnel Relations," by H. J. Noble, American Cast Iron Pipe Co., and "How Does Sand Affect the Physical Properties of Castings," by H. W. Dietert, H. W. Dietert Co. A film, "Production of Iron and Steel," prepared by U. S. Steel Corp., was shown at one of the evening meetings.

Between sessions the foundrymen visited various plants in the Birmingham district, with particular interest being shown in a visit to Woodward Iron Co. where R. M. Marshall, a company offical, explained the functioning of a blast furnace air conditioning unit recently installed and discussed plans to install another conditioning unit shortly.

At the Friday evening banquet it was pointed out that four men present had been honored by the National Association of Manufacturers as "Modern Pioneers." These men were Erskine Ramsay, John N. Caruthers, Wallace L. Caldwell and W. D. Moore.

. . . PERSONALS . . .

WARREN R. EATON has been elected vice-president and production manager of Bliss & Laughlin, Inc., Harvey, Ill.

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GEORGE A. SMITH, heretofore assistant plant manager of the Meriden, Conn., factory of the New Departure Division, General Motors Corp., has been appointed assistant general manager of the Hydra-Matic Transmission Division of General Motors Corp., Detroit. He joined New Departure in 1920 as foreman of machining inspection and advanced rapidly through various positions until his appointment last year as assistant plant manager.

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EDWARD S. PEROT, since early 1939 executive vice-president of the Crocker-Wheeler Electric Mfg. Co., Ampere, N. J., has been elected president. He was at one time vice-president of the National Conduit & Cable Co., for three years president of Dictograph Products Co., and for six years president of Southern Dairies, Inc. Other officers who have been elected are: WALLACE K. BROWN and BEN D. CHRISTIAN, vice-presidents; EDWARD C. JONES, secretary, and KENNETH S. MURRAY, assistant treasurer.

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D. ROBERT YARNALL, president of Yarnall-Waring Co., Philadelphia, has been appointed to the Business Advisory Council for the U. S. Department of Commerce.

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HARRY T. WOOLSON, executive engineer of Chrysler Corp. and past-president of the Society of Automotive Engineers, has been appointed president of the Chrysler Institute of Technology. He will continue his duties as executive engineer. JAMES C. ZEDER has been made chairman of the board of education of the Chrysler Institute. CARL BREER is on the board and FRED M. ZEDER continues as chairman of the board of trustees.

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CLAIRE L. BARNES, founder and chairman of the board of Houdaille-Hershey Corp. is resigning from the chairmanship as of March 31, but will continue as a director. He served as president from January, 1929, when the company was organized, until June, 1937, when he resigned because of ill health. Mr. Barnes has devoted 45 years to active business and intends to resign and recuperate his health.

C. F. CHRISTOPHER, formerly with the American Locomotive Co., railway steel spring division, Latrobe, Pa., who, as stated in THE IRON AGE of Feb. 22, has joined the Steel Co. of Canada, Hamilton, Ont., has been assigned special duties with that company. The previous item incorrectly stated that he had been made chief metallurgist, a position held by J. G. MORROW, who continues in that capacity.

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ROGER W. NEWBERRY, former assistant director of the Bucyrus-Erie Co. English branch, has been appointed assistant general sales manager of the company. He recently returned from England and has been with the firm 25 years.

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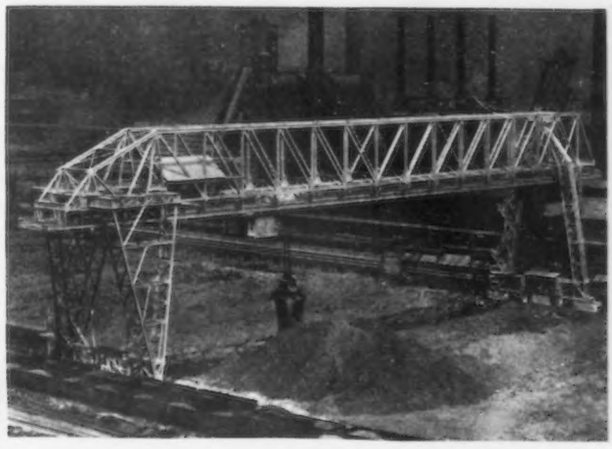
W. JAMES FREDERICK, president of the Frederick Steel Co., Cincinnati, was elected chairman of the Cincinnati



DRAVO

DESIGNS AND BUILDS

ORE BRIDGES

This 12-Ton Ore Bridge, designed and built by DRAVO for the Clairton Plant of the Carnegie-Illinois Steel Company is a 314' span with both ends overhanging the legs, making the total length of trolley track 400 feet. The man trolley, which with its bucket and load of ore weighs about 120 tons, travels at a speed of 900 feet per minute. The entire bridge, weighing more than 800 tons, travels 125 feet per minute and is of the skew type permitting either end to advance 20 to 25 feet ahead of the other. The bucket is lowered and raised with load at an average speed of 225 feet per minute. All controls are fully magnetic and the bridge travel motors are interlocked with automatic spring powered rail clamps.

Added to its ability to fabricate and erect structures such as the one shown here, Dravo Corporation has had years of experience building docks, retaining walls, plant foundations, everything that enters into the problem of terminal facilities. Inquiries relative to specific problems may be addressed to

DRAVO CORPORATION

ENGINEERING WORKS DIVISION

General Offices and Shops:

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chapter, American Society of Tool Engineers, at a meeting Feb. 27. Others elected are: Vice-chairman, THOMAS KLING, Lodge & Shipley Machine Tool Co.; treasurer, CHARLES CARR, JR., R. K. LeBlond Machine Tool Co.; secretary, W. D. AVERILL, Cincinnati Milling Machine Co.

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HAROLD L. DUBLIN has resigned, effective March 1, as Cleveland representative in the sheet and strip sales division of Jones & Laughlin Steel Corp. Following 24 years with Follansbee Brothers Co., the last two years of which he served as Cleveland district manager, Mr. Dublin went with Jones & Laughlin in October, 1936.

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PHILIP D. REED, chairman of the board of the General Electric Co., was the principal speaker before a huge banquet audience that filled the large Milwaukee Auditorium for the annual On Wisconsin dinner given by the local chapter of Wisconsin university's alumni.

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COL. W. W. COLEMAN, president of the Bucyrus-Erie Co., Milwaukee, and head of the Wisconsin department of the American Ordnance Association, is making arrangements for an "off the record" meeting of his organization with LOUIS JOHNSON, Assistant Secretary of War. Mr. Johnson will discuss quickened American defense preparations.

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PAUL G. WEBSTER, chief order clerk, sheet division, Gary sheet and tin mills, Carnegie-Illinois Steel Corp., has been transferred to the corporation's Pittsburgh order division. EDWIN L. BURTON will succeed Mr. Webster at Gary and ERNEST C. GERBIG will receive the post of assistant chief order clerk.

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W. L. KENNICOTT has been appointed representative in Southern California for the McKenna Metals Co., Latrobe, Pa., succeeding the late G. B. Ferguson. Mr. Kennicott will make his headquarters at 4905 South Santa Fe Avenue, Los Angeles.

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J. M. READ, of New Bedford, Mass., has been named a director of Revere Copper & Brass, Inc., New York.

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JOHN C. GEBHART, since 1936 executive director of the National Economy League, has been appointed director of research of the National Association of Manufacturers, New York.

New Fuel Pump Lifts Altitude of U. S. Planes

CLEVELAND — Through a new hydraulic fuel system which stabilizes fuel pressure at high altitudes, United States military airplanes will fly higher and safer. Sergeant Ralph E. Gray, of Wright Field, Dayton, Ohio, and the Pump Engineering Service Corp. here have developed the new system. Though an explanation of the pumps' working is closely guarded by government sources, it is understood two reasons for its efficiency are: (1) the new system permits the location of the pump at a point remote from the engine, thus eliminating previously felt heat from an overloaded engine and (2) its location below the level of fuel in the tank.

Until recently military planes have found it virtually impossible to gain and efficiently maintain consistently

Performance Records

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All performance records are based on good bearings. When you define the desired speed, load and life of a motive unit — and then design bearings to meet *all* of the operating conditions — you gain the utmost in performance. In the majority of cases you likewise gain a lower unit cost.

It is an easy matter to accomplish this. Simply bring the operating facts to us. A Johnson engineer or metallurgist—backed by 40 years exclusive bearing experience will match his time against yours to reach the right answer. As manufacturers of *all* types of sleeve bearings we base our recommendations strictly on facts, free from all prejudice.

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altitudes up to 20,000 ft., yet high altitudes are necessary, due to the effective distances of anti-aircraft guns.

Earlier fuel systems, most of which are still in use, forced more that a sufficient amount of gasoline through fuel lines to answer requirements of engines. Excess quantities were fed back through bi-passes into the fuel line. However, at high altitudes the surplus gasoline tended to vaporize. Thus when repumped into aircraft engines it resulted in "vapor lock," as the vapor rather than liquid fuel went to the engines and the engines refused to function efficiently at altitudes approaching 20,000 ft. or above.

Treasury Opens Manganese Bids

WASHINGTON—The Treasury Department's Procurement Division recently opened bids on manganese ore from 16 companies. It also invited bids for 5000 tons of manganese ore to be opened March 6. A contract for 5000 tons had previously been awarded to the Greenbrier Mining Corp., White Sulphur Springs, W. Va., but officials said the company had been disqualified by failure to furnish the required performance bond.

The company, in which Representative Andrew J. May, chairman of the House Military Affairs Committee, is understood to have a substantial interest, was awarded the $180,000 contract in October. Although the company was given 120 days—60 days of which represented an extension of time—to furnish the performance bond, one was not forthcoming when the period expired. It was explained that if the Procurement Division is unable to get as favorable a price as that covered in the Greenbrier contract, the defaulting contractor will be required to put up the difference. Officials said they did not know what the situation would be if the new price is below that covered in the Greenbrier contract.

The bids called for manganese ore, ferro grade A, B, or C, for delivery, f.o.b. cars, Army Ordnance Depot, Curtis Bay, South Baltimore, Md.

Details on the latest manganese bids to be received by the Procurement Division follow:

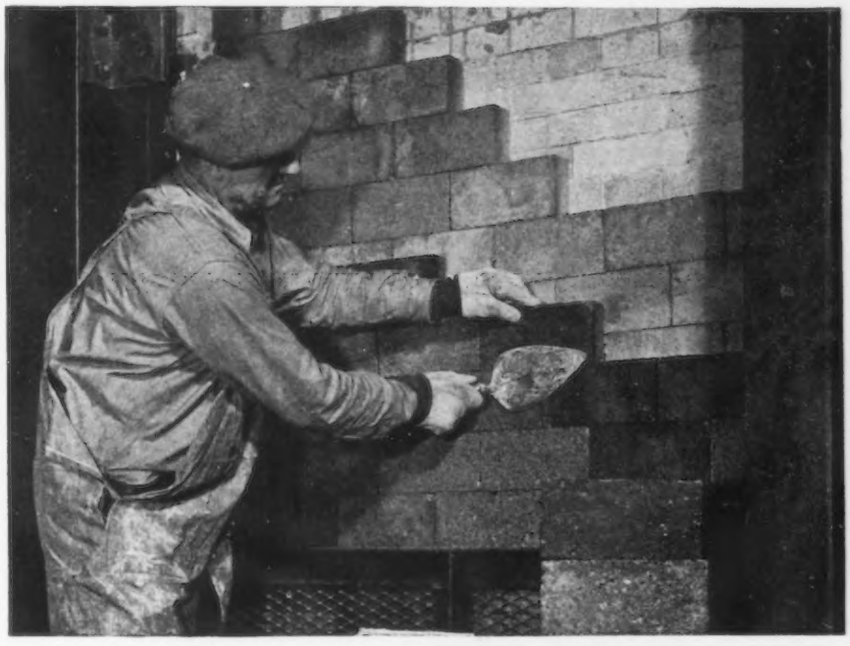
Henry Allen, Pasadena, Cal., 45,000 tons, grade A, Mexican ore, 50c. per unit; Commercial Engineering Co., Washington, D. C., 20,000 tons, grade A Canadian ore, 60c. per unit; William Muller & Co., Inc., New York, 6000 tons, grade A, South African ore, 47.95c. per unit, with the qualification that ore be analyzed on lot basis rather than on car shipments; National Resources, Inc., Los Angeles, 2000 tons grade C domestic ore, 65c. per unit.

North American Manganese Corp., St. Louis, 10,000 tons grade A domestic ore, 64c. per unit, grade B ore 62c., grade C 63c.; Oliver & Co., Inc., Cleveland, 45,000 tons grade A $1.041, grade B $0.9895, grade C $0.9375. The latter bid was on the basis of supplying domestic ore from Alta Vista, Va., the company reserving the right to a six-month extension on delivery and to ship from other domestic sources if necessary.

Frank W. Orr, Bakers Field, Cal., 5000 tons grade B domestic ore 85c. per unit; B. D. Palfreyman, N. Provo, Utah, no price quoted but indicated on hand for sale up to 100,000 tons of ore, 32 per cent manganese content; L. L. Patrick, Los Angeles, 5000 tons grade A Utah ore, 62c. per unit; James E. Tinsinger, N. Hollywood, Cal., 2000 tons grade B domestic ore, 63c. per unit.

Derivatives, Inc., and Tonerde, Inc., both of New York City, British-Indian, Brazilian and South African ores, 2000 tons 49c., 11,000 tons 53c., 7000 tons 56c.; Great Valley Manganese Co., Inc., Stuart's Draft, Va., 2000 tons grade B, 75c.; C. Tennant Sons & Co., New York City, agents Fernandex Hermanos, Philippine Islands ore 2000 tons grade A 62.8c. per unit.

L. W. Lambert, Upper Lake County, Cal., 18,000 tons grade B Philippine ore 65c.; Cuban-American Manganese Corp., New York City, 25,000 tons grade B Cuban ore 64c.; H. S. Davis Co., 22,500 tons grade C South African ore 53.75c. The latter bid described the ore as better than 45 per cent manganese but would not guarantee it to be 48 per cent.



Therm-O-flake
INSULATION BRICK

One of lightest insulation brick available—(about one pound each).
Has low thermal conductivity, and is most economical for efficient insulation.
Can be compacted without breaking and cuts easily.
Especially valuable for back up work behind fire brick walls.
Acts as expansion cushion between furnace walls and binding structure.

Write for Information and Prices

Other Therm-O-flake Products
Made from Exfoliated Vermiculite
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Illinois Clay Products Company
JOLIET, ILL.

LABOR BOARD RULINGS

WASHINGTON—The Labor Board this week:

Called an election to be held within 30 days among pattern makers employed by the Walworth Co., Greensburg, Pa., to determine whether they desire to be represented by AFL's Pattern Makers League of North America, by SWOC's Amalgamated Association of Iron, Steel and Tin Workers or by neither. Board Member Edwin S. Smith dissented.

Certified Square Deal Lodge No. 40, Amalgamated Association of Iron, Steel and Tin Workers, as the sole bargaining agent for the employees at International Nickel Co.'s Huntington, W. Va., plant. An election showed 636 for the CIO, 407 for Nickel Alloys Employees' Association, Inc., and 141 for neither.

Directed Valley Steel Products Co., Cairo, Ill., to bargain with AFL's Fabricated Metal Workers Union, Local No. 22199, as the exclusive representative of its production and maintenance employees.

Ordered an election within 30 days among the hourly-paid production and maintenance employees of the Ideal Electric & Mfg. Co., Mansfield, Ohio, to determine whether they desire to be represented by CIO's Local 705, United Electrical, Radio, and Machine Workers. An unfair labor practice complaint involving this company was dismissed.

Refused the petition for investigation and certification of representatives filed by Hyatt Employees Association, Inc., on behalf of all hourly-paid employees of Hyatt Bearings Division of General Motors Corp., Harrison, N. J., following an election resulting in a count of 483 for and 643 against the unaffiliated union.

Certified the Sharon Westinghouse Employees Association as the sole bargaining agency in two units composed of all hourly paid employees and all salaried employees of Westinghouse Electric & Mfg. Co. at its Sharon, Pa., plant, upon the basis of separate elections resulting in the following counts: Hourly paid employees, Sharon Westinghouse Employees' Association, 1876; against SWEA, 742. Salaried employees, Sharon Westinghouse Employees Association, 422; against SWEA, 12.

To Regional Director Frank H. Brown, Detroit, has been left dating of elections ordered by the board among 125,000 production and maintenance employees, pattern makers and die sinkers at 59 plants of the General Motors Corp., in 12 states. The board's direction of election was based upon an agreement entered by the corporation, the AFL and the CIO.

The board certified SWOC's Amalgamated Association as the sole bargaining agency at the Sharpsville, Pa., plants of Shenango-Penn Mold Co. and Shenango Furnace Co., following an election of production workers resulting in a count of 247 to 195 in favor of the CIO affiliate.

George H. Alexander Machinery, Ltd., Birmingham, England, which was licensed December, 1938, by McKenna Metals Co., Latrobe, Pa., to sell Kennametal tools throughout the British Empire, is erecting two plants in Great Britain for the fabrication of Kennametal tools. Philip M. McKenna of the McKenna Metals Co., Latrobe, Pa., reports that sales of Kennametal, both foreign and domestic, reached an all-time high in February. Kennametal is a tungsten-titanium carbide alloy for cutting steels of all hardnesses up to 550 Brinell, and other metals.

SET UP YOUR MACHINES AND STEP UP PRODUCTION with MUREX VERTEX

THE ALL-POSITION REVERSE POLARITY ELECTRODE THAT TAKES MORE CURRENT AND SPATTERS LESS

You can speed up work with Murex Vertex electrodes and still get the sort of welds that enhance the appearance of any welded structure.

Welders, too, like the way this rod performs; its soft arc action; the ease with which it handles in all positions; the small amount of spatter.

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Albany • Chicago • Pittsburgh • So. San Francisco • Toronto
"Murex Electrodes — Thermit Welding — Thermit Metals & Alloys."

In building drill rigs and other equipment, Brauer Machine & Supply Co., Oklahoma City, finds Vertex economical.

Vertex provides speedy construction of tugs, built by Ira Bushey & Sons Co., Brooklyn, N. Y.

Neat appearance of Vertex welds lends sales appeal to shovels, produced by Hanson Clutch & Machinery Co., Toledo, O.

MUREX HEAVY COATED Electrodes
A COMPLETE LINE FOR EVERY WELDING APPLICATION

Investigate Thermit Welding, too—in use since 1902 for heavy repair work, crankshafts, etc.

Britain, Reich Reported Studying Brazil Plan Dropped by U. S. Steel

VARYING reports regarding the tentative establishment of a steel industry in Brazil, utilizing native iron ore, came this week from Rio de Janeiro, where President Getulio Vargas has signed a decree creating the Metallurgic Institute.

The new organization is said to be preparing to set up blast furnaces, open hearths and mills for manufacturing rails, bars and sheets, with capital to be provided by the Government and private sources.

Krupp Is Mentioned

Recently United States Steel Corp. dropped a plan for building a steel plant in Brazil and the Brazilian Government was reported attempting to interest other North American steel companies.

Later dispatches from Rio concerning the steel project, which has been discussed in Brazil for several decades, said that the German Krupp interests had approached the Brazilian Government with a proposal to set up a steel plant in the South American republic, a possibility considered impossible for Germany because of the war. Great Britain also was reported interested in such a project.

Obstacles Substantial

Capitalization of the proposed steel company to be set up by U. S. Steel and the Vargas government, according to Brazilians, was to total $40,000,000, of which $20,000,000 was to be in debentures to be placed by the Brazilian Government, and $20,000,000 in stock, half common and half preferred. U. S. Steel, according to these reports, was to take $5,000,000 of the common stock, controlling the company. The plant was to produce 300,000 tons of steel a year.

Obstacles to the development of any but a state-subsidized steel industry in Brazil and in most other South American countries are considered substantial by some observers. Among these are: (1) Lack of coal, the known Brazilian deposits being low-grade, (2) lack of good transportation facilities on railroads of varying gages, (3) absence of important nearby markets, (4) lack of industrially-trained workers, (5) instability of national and provincial governments, (6) a history of bond defaults, making North American investors hesitant to buy South American securities, (7) distance of Brazil's ore deposits from the seaboard, (8) and competition of North American steel plants strategically located for the export trade.

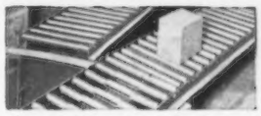
Plant Prepares to Make Shell Forgings for U. S.

PITTSBURGH — Pressed Steel Car Co., Inc. within the next three or four months plans to complete facilities for production of shell forgings in event this is desired by the Government. The Government has already placed an "educational" order with Pressed Steel Car for 15,000 shell forgings of the 75 mm. size.

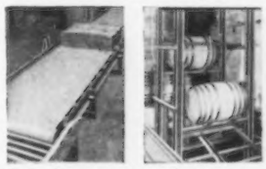
The company is to purchase a large forging machine of a type now used in England (but not in the United States). It will be built by the Baldwin-Southwark Corp., Philadelphia. This equipment will draw and pierce billets in two operations and has a capacity of 170 to 180 shells an hour. The installation of other machines at

25% INCREASE IN OUTPUT!

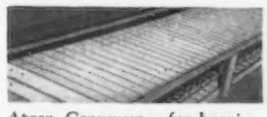
- AND ANNUAL CASH SAVING OF $3000! . . .



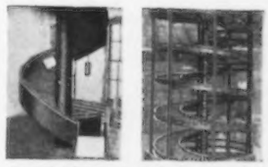
Gravity Conveyors—basis most installations. *Live Rolls*—power-operated roller conveyor.



Belt Conveyors—used for medium duty power conveying. *Vertical Lifts*—lift and lower.



Apron Conveyors—for heavier duty power conveying. Inclined and horizontal applications.



Spiral Chutes and *Roller Spirals*—"vertical" lowering by gravity.

Write for copy of Case No. 10. The "high vitamin content" of this case history will surprise and stimulate you, start you thinking conveyor-wise, perhaps produce that handling idea you have been looking for.

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Read this fact-finding story about a Logan installation in a metal working plant. Case No. 10, and five other case histories recently prepared, will be mailed at once on request, no obligation.

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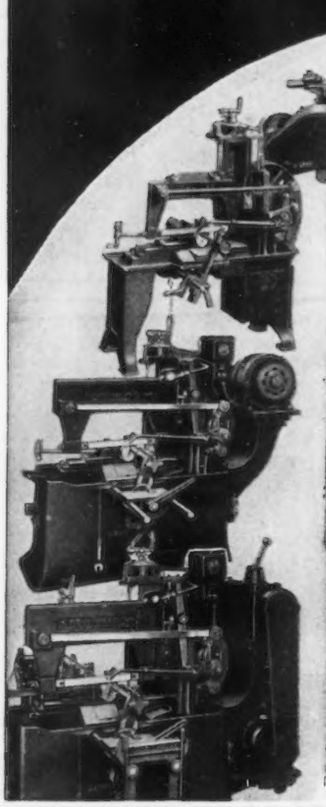

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Non-Breakable High Speed Hack Saw Blades.

A "giant" **Hydraulic Hack Saw** of 18"x18" capacity. (The world's largest hack sawing machine.)
Full Automatic Production Hack Sawing Machines in two sizes equipped with either normal service automatic bar push-up or with special "heavy-duty" automatic bar push-up for extremely heavy work.
All-ball bearing Heavy Duty High Speed Hack Sawing Machines.
Dry cutting, general utility Shop Saws, at extremely low prices.
The largest capacity universal metal cutting **Band Saw Machine.**
Also, new, novel Hand Hack Saw Frames, and non-breakable high speed hand hack saw blades for heavy-duty production work.

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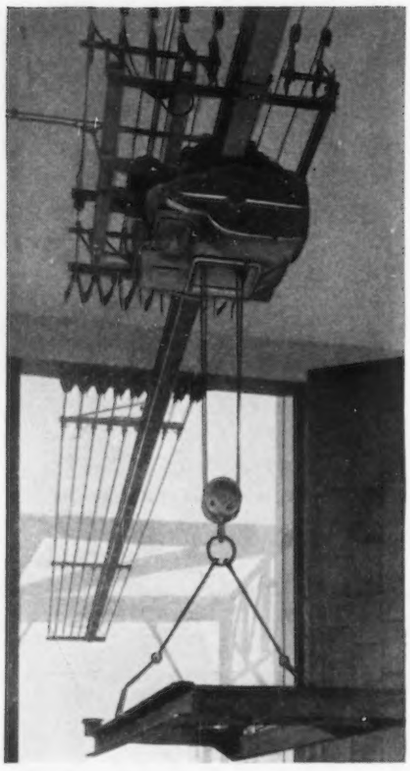
A new idea in CONTROLLED MATERIAL-FLOW *with* R & M

LOW HEADROOM HOISTS



From outdoor yard storage to second-floor machine shop in *one* operation . . . controlled by *one* man . . . from *one* point. That's the sort of time-saving, cost-reducing material-flow you can get with the new R & M Low Headroom electric hoist and motor-driven trolley, as illustrated here.

It has a hoisting speed of 20 ft. per min. and trolley travel speed of 100 ft. per min. In this installation every foot of material movement is controlled from a station inside the second-floor door.

This is the R & M answer to one man's problem. Controlled material-flow with R & M Low Headroom Hoists may be your solution, too. Just give us the facts, briefly, and we'll be glad to talk it over with you.

All R & M Electric Hoists are of compact, low-headroom design, giving you 1′ 6″ to 2′ 6″ more usable space than would hoists of conventional design.

ROBBINS & MYERS, Inc.
HOIST & CRANE DIVISION • SPRINGFIELD, OHIO

the McKees Rocks plant of Pressed Steel Car, however, could make possible a capacity of 600 shells an hour.

The company is also contemplating the installation of a new type rotary heating furnace, a product of Amsler-Morton Co., Pittsburgh.

Unfilled orders of Pressed Steel Car at the present time amount to $14,000,000 compared with $1,700,000 a year ago. Freight car backlogs will carry operations into the second quarter while subway car business will last until August. Earnings for 1939 showed a net loss of $688,603 compared with a net loss of $1,169,778 in 1938.

Buyers Can Explain U. S. Way of Life, Hook Says

DETROIT—Obligation of the purchasing agent to explain and help protect the private enterprise system was emphasized by Charles R. Hook, president, American Rolling Mill Co., who was guest speaker recently at the annual Executives Night of the Purchasing Agents Association of Detroit. Contacts of the buyer should be exercised advantageously to educate Americans in the advantage of "the American way" of life, and the purchasing agent should make use of his wide knowledge of business affairs and world movements to clarify some of the misconceptions of business aims, Mr. Hook declared.

He explained in detail some of the activities of the National Asociation of Manufacturers, of which he is past president, and quoted from NAM investigations of relative buying power in various nations. Research shows, he asserted, that the workingman's purchasing power is many times greater in America than in the totalitarian states of Europe.

"Never before has industry had such complete and persuasive information to establish the basic facts about private enterprise," Mr. Hook said, "but the system of private enterprise needs packaging, advertising and selling, just as any other goods must be presented."

Regarding the Dies Committee investigations, the steel executive declared that there can be no implication that the committee's efforts threaten the right of free speech. This right must always be defended, he said, but evidence submitted to the Dies Committee reveals that alien and seditious ideas have been spread dangerously throughout the nation "by force, sedition and crime."

He asserted that the best way to "lick the soapbox orator" is by plac-

ing facts in the hands of the man on the street.

Illustrating different results produced by free enterprise and by totalitarian control, he cited the "modern Tale of Two Cities—Helsinki and Leningrad," comparing the industrious hardy Finns, a self-reliant race, with the Russian servants of the master, Stalin. He classified the average Russian citizen as truely ill-housed, ill-fed and ill-treated, without the incentive of free enterprise.

Hopkins Appoints 14 to Business Advisory Council

WASHINGTON — Secretary of Commerce Harry L. Hopkins has named 14 new members to the Business Advisory Council, the agency which has appraised New Deal policies since 1933, although the Administration has done little or nothing on the basis of its findings. Included among the new members are:

Clarence Avildsen, board chairman, United Drill & Tool Corp., Chicago, and already a part-time economic adviser to Mr. Hopkins; James W. Hook, president, Geometric Tool Co., New Haven, Conn.; Cornelius F. Kelley, president, Anaconda Copper Mining Co., New York; W. S. Newell, president, Bath (Me.) Iron Works Corp., and D. Robert Yarnall, of Yarnall-Waring Co., Philadelphia.

Commerce Department officials described Mr. Yarnall as a representative of small businessmen.

Although the council's opinions have invariably been critical of New Deal policies, the Administration has never appeared to be favorably disposed towards its recommendations.

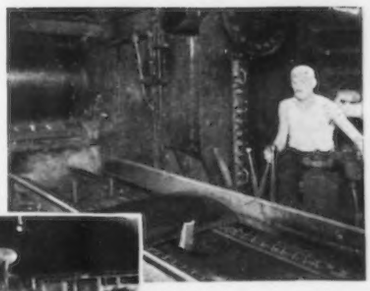
SWOC Holds Annual Convention on May 14

PITTSBURGH — The second SWOC international convention is to be held in Chicago beginning May 14, it was disclosed here early this week. Among the resolutions adopted by delegates to a local district convention here, was one calling on the membership of the CIO and the AFL to demand that their leaders heal the breach in labor's ranks and bring about unification of the two organizations.

Philip Murray, SWOC chairman, expects approximately 1000 delegates at the Chicago meeting. The local conference here marked the start of a campaign "to make their local 100 per cent dues paying in order to have the fullest representation."

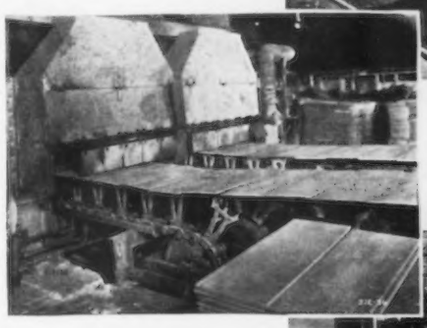
CHAINS BUILT TO TAKE SEVERE PUNISHMENT...HEAT

Because of their high inherent strength and superior wear-resisting features, Jeffrey chains are found on hundreds of steel mill applications where high unit loads must be handled under intense heat. Three applications are illustrated here. Jeffrey chains excel in this kind of severe service.



Top — Jeffrey steel thimble roller chain on feeder and catcher table.

Lower right—Jeffrey No. 1348 chain in 24-hour crop conveyor service.



Jeffrey No. 1380 chain is giving excellent service on this continuous furnace job (left) where intense heat is prevalent.

Jeffrey engineers approach steel mill conveyors with a complete understanding of the special problems . . . know that unit loads are high and that heavy weights are concentrated on small areas . . . and build chains accordingly. Write for data.

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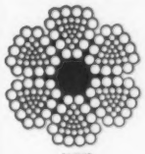
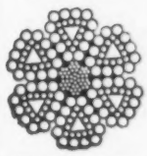
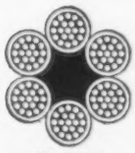
Style B Flattened Strand



"B" Flattened Strand



Wire Rope Center



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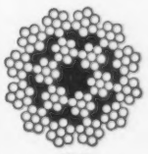
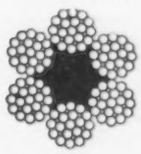
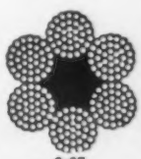


18x7 Non-Rotating



6x19 Filler Wire

6x19 Scale



6x37 Extra Flexible

8x19 Extra Flexible

Crisis Near for Bill Curbing U. S. Agencies

WASHINGTON—The Logan-Walter Bill, designed to subject all Government quasi-judicial agencies to more uniform procedure and thereby curb the functions of New Deal Administrative agencies, this week faced a showdown in Congress, where the measure is pending on calendars in both Houses.

Administration forces, fearful that the measure would cramp the style of too many agencies administering laws enacted by the New Deal, were attempting to stall consideration of the measure by pointing to the necessity of first completing a study under way by a special committee which will report directly to the Justice Department on the problem of unifying administrative procedure.

Administration lieutenants have the support of the Brookings Institute, which has been critical of many New Deal proposals during the past seven years. In permitting the courts to review rules and regulations, as proposed by the Logan-Walter Bill, it disregards the constitutional separation of powers and seeks to compel the judicial authorities to interfere with acts of sub-legislation properly delegated to administrative agencies, the institute reports.

On the other hand, sponsors of the bill, including Representative Francis Walter, Democrat of Pennsylvania, have pointed out that President Roosevelt recognizes "the menace of this (administrative) system" as indicated by word sent out from the White House that some agencies ought to use "good common horse sense in adminisering the new laws and to stop trying to be prosecutors, juries, judges and executioners."

U. S. Educational Orders

WASHINGTON—Award of contracts for educational orders totaling $753,119 was announced on Monday by the War Department. Among the companies receiving awards were:

Chrysler Corp., Detroit, cartridge cases and related items, $154,082; W. C. Norris Manufacturer, Inc., Tulsa, Okla., shell machining and related items, $76,689; Precision Mfg. Co., Philadelphia, telescope mount and related items, $71,220; Builders Iron Foundry, Providence, R. I., telescope mount and related items, $105,509.

Blaw-Knox Employees Get Report By Candid Camera

BLAW-KNOX CO., which last year explained its business to employees in a special financial report, this week offered workmen in its plants a candid camera report on the company's production activities.

A picture booklet, carrying an explanation by William P. Witherow, chairman, portrays major operations in the Pittsburgh Rolls, National Alloy Steel, Power Piping, Lewis Foundry & Machine and other divisions and described the far-flung markets to which the company's products go.

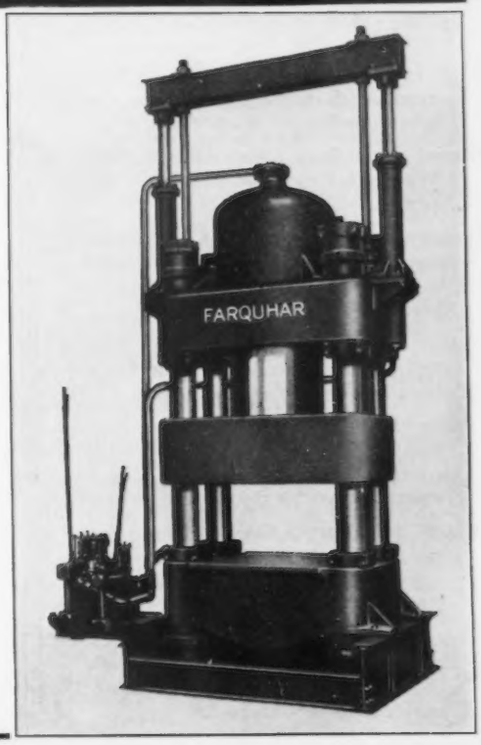
"Stockholders invest money, and employees invest work in the production of a company's goods or services, and both investments are secure only to the extent to which the resultant products are useful and economical to others," Mr. Witherow said.

Blaw-Knox products are of the "earner" type, Mr. Witherow continued, and are mainly tools which help produce other goods better, more economically, and in more generous amounts. Improvement of workmanship in industry, through engineering surveys and laboratory tests, is "responsible for the nation's high level of consumption," the Blaw-Knox executive said. "Continued expansion in living standards will," he added, "come from climbing product values. Better tools and more inventive industry will be important factors in producing this greater wealth. True prosperity and real security thus come, not from artificial stimulants, but from such fundamental contributions as our ability to produce increasingly better goods and services."

Organizing Northern N. J. Welding Society Section

AN organization meeting of the northern New Jersey section of the American Welding Society will be held March 14, 7.30 p.m., in the auditorium of the Public Service Terminal Building, 80 Park Place, Newark, N. J. In addition to the initial business session, with election of officers, the program includes an address on "Building a Mobile Airport," by K. W. Couse, Couse Laboratories, Inc. Mr. Couse will describe recent developments in rendering first aid to aviation and illustrate outstanding examples of welded construction for extra heavy duty. The meeting is open to all persons interested in welding.

FARQUHAR
HYDRAULIC PRESSES



THIS 1500-ton Farquhar Hydraulic Forging Press is specially designed to stand excessive eccentric loading. Presses of this type can be furnished in various sizes and capacities to meet the demands of modern, high speed production systems.

Big industrial names like General Electric, American Chain and Cable, Pennsylvania Railroad rely on Farquhar engineering experience to meet their particular specifications. The U. S. Government has ordered over 150 Farquhar Presses in the past 20 months.

Send for new Hydraulic Press Catalog.

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● Perforated metal is for a thousand uses, some of which require precision workmanship to accomplish results otherwise impossible.

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The Harrington & King PERFORATING Co.

5657 FILLMORE ST., CHICAGO 114 LIBERTY ST., NEW YORK

. . . THE NEWS IN BRIEF . . .

Activity on 1941 cars threatens to flood tool and die shops with work; February nears production record.—**Page 72.**

New steel price schedule in France results in increases on some finished products.—**Page 76.**

House Judiciary Committee told Walsh-Healey Law should be repealed.—**Page 76.**

Employers of apprentices at under legal minimum wage affected by new regulation of Labor Department.—**Page 78.**

House measure would prohibit new sources of water pollution from industrial plants.—**Page 78.**

Unions can't sue employers for contempt in failure to comply with court decree, Supreme Court rules.—**Page 79.**

House Foreign Affairs Committee may be authorized to bring survey on tin supplies up to date.—**Page 79.**

Wage-Hour law administrator liberalizes requirement forcing manufacturers to keep job records in various state.—**Page 79.**

Monograph on steel industry expected to be submitted to TNEC by midsummer.—**Page 82.**

Government department purchasing through Procurement Division still lags.—**Page 83.**

U. S. Housing Authority estimates its low-cost program will require 275,000 tons of steel.—**Page 83.**

Government contracts reported for week ended Feb. 24 total $601,165.—**Page 84.**

Greece adopts import quotas for hand tools, other items for first half of 1940.—**Page 84.**

War requirements force Canada to turn to U. S. manufacturers for more steel.—**Page 85.**

Bethlehem Steel hires 25,000 in 1939, liberalizes 1940 vacation plan. **Page 87.**

Priestley lectures on physical metallurgy are scheduled by Penn State for March 11-15.—**Page 87.**

$18,000,000 construction program is announced by Michigan Bell Telephone Co.—**Page 87.**

Low grade copper ore deposits reported found in lower Silesia, Germany.—**Page 89.**

Member of AFL affiliate sues union for $5,000, alleging discrimination in job assignments.—**Page 89.**

Accelerated tests for aging windshield plastics are developed by Bureau of Standards.—**Page 89.**

Allis-Chalmers Mfg. Co. receives order for $700,000 power unit.—**Page 89.**

Unemployed total rises 889,000 in January, according to National Industrial Conference Board.—**Page 89.**

SECTIONS INDEX

MEETINGS

March 7 and 8—Grinding Wheel Manufacturers Association and Abrasive Grain Association, Southern Pines, N. C.

March 7 to 9—American Society of Tool Engineers, annual meeting, New York.

March 14 and 15—Society of Automotive Engineers, national aeronautic meeting, Washington.

April 10 to 12—International Acetylene Association, annual convention, Milwaukee.

April 11 and 12—Galvanizers Committee of American Zinc Institute, annual spring meeting, Pittsburgh.

April 25 and 26—Concrete Reinforcing Steel Institute, 16th annual meeting, Hot Springs, Va.

May 6 to 10—American Foundrymen's Association, annual meeting and equipment exhibition, Chicago.

May 7 and 8—Society of Automotive Engineers, national production meeting, Hartford.

May 20 to 22—American Gear Manufacturers Association, annual meeting, Asheville, N. C.

May 23—American Iron and Steel Institute, annual meeting, New York.

Hot Dip Galvanizers Association's annual meeting hears papers on fuel, fluxing problems, other topics.—**Page 90.**

Birmingham foundrymen hear Governor Dixon of Alabama discuss economic problems of the South. **Page 91.**

New hydraulic fuel system permits U. S. military planes to reach higher altitudes.—**Page 94.**

NLRB calls election for Walworth Co. pattern makers, certifies SWOC as representative of International Nickel Co. plant workers.—**Page 96.**

Pressed Steel Car Co. plans to complete facilities for making 75 mm. shell forgings.—**Page 97.**

Purchasing agents can explain and help protect the private enterprise system, Charles R. Hook, Armco president, says.—**Page 98.**

Secretary Hopkins appoints 14 to Business Advisory Council. —**Page 99.**

Steel Workers Organizing Committee will hold its second annual convention May 14 at Chicago.——**Page 99.**

Blaw-Knox Co. employees are given candid camera report on company's production activities. —**Page 101.**

Carnegie - Illinois Steel Corp. will move Mingo Junction blooming mill to Donora, Pa., works.—**Page 104.**

Daily pig iron output in February drops 12.2 per cent.—**Page 104.**

The Iron Age capital goods index declines slightly to 81.5.—**Page 113.**

Workers on steel payrolls 556,000 in January against 451,000 in January, 1939.—**Page 129.**

Total ore shipments from Mesaba Range in 1939 total 30,314,857 tons.—**Page 129.**

Mesta Machine Co. enlarges its forging facilities at cost of $1,000,000, earns $2,715,427 in 1939.—**Page 129.**

Business expansion brings night shift of workers at Clark Controller Co. plant, Cleveland.—**Page 129.**

Export demand for tractors reported increasing.—**Page 129.**

One hundred and sixty men enroll in shop training course to provide skilled labor for heavy demands from Cleveland aircraft parts makers. **Page 134.**

Republic Independent Unions Appeal to Supreme Court

THE Central Council of Republic independent unions, consisting of Republic Steel Corp. employees, has filed with the Supreme Court an appeal to set aside that part of the NLRB order directing the company to withdraw recognition from it on the ground that the council is a company union.

The council said it is a voluntary not a company-sponsored organization. The company request for a Supreme Court review of the NLRB order was filed in early February.

Republic Planning to Modernize Furnaces

CLEVELAND — Republic Steel Corp. will undertake modernization of several blast furnaces, it was learned unofficially here this week. One of the four stacks here will be rebuilt and enlarged at a cost of around $75,000. Capacity will be brought up to 1000 tons, giving the company four 1000-ton stacks of the 16 it possesses. In the Birmingham district, the No. 1 furnace is being dismantled and will be replaced with a new unit having approximately 100 tons greater capacity. Under consideration is repair of a stack in the Youngstown district.

National Steel Employees Averaged $1,823 in 1939

PITTSBURGH—National Steel Corp.'s annual report reveals substantial increases in net earnings, payrolls, number of employees and working capital. E. T. Weir, board chairman, points out that a total of $8,700,-246.04 was expended last year for plant and equipment and reports that a program of extensive improvements is now under way in the 48-in. continuous strip mill as well as in the tin plate mills at Weirton, W. Va., with no additional financing necessary to cover the improvements.

National Steel's net earnings for 1939, after interest, depreciation and federal taxes, amounted to $12,581,-635.69, equal to $5.71 per share on 2,-202,167 shares of capital stock outstanding at the year end. A total of $3,738,383.90, equal to $1.70 per share, was paid out in dividends during 1939.

The average number of employees in 1939 was 20,099 compared with 17,-623 in 1938. Payrolls mounted to $36,-651,186.68 in 1939, an increase of $9,042,301.58 over the 1938 total of $27,608,885.10. The average wage payment to each National Steel employee was $1,823.53. Taxes totaled $6,337,540.99 and were equal to $2.88 per share of outstanding stock or to $315.32 for each employee. Inventories showed an increase over the previous year of $2,799,439.44.

National Steel stockholders will meet March 25.

New Company to Build Smelter Near Oregon Mines

SALEM, Ore. — Incorporation papers have been filed here for Columbia City Metals, Inc., at $100,000. The firm intends to construct a smelter at Columbia City, Ore., utilizing ore from mines at nearby Yankton. These mines are not far distant from Scapoose, where ore will be mined for the operations of Sierra Iron Co., which recently announced plans for a plant at Vancouver, Wash. Howard Davis of Stack-Davis Co., Portland, will head the new concern.

Photographic Reproduction On Stainless Steel

A PROCESS of reproducing photographic images on stainless steel, a comparatively new development, has been utilized by the Republic Steel Corp., Cleveland, as a means of perpetuating honors earned by the Michigan mining group in a safety campaign. There were four competing groups—Michigan ore mines, Northern coal mines, steel plants and subsidiaries. Respective winners were Michigan ore mines, Northern coal mines, Warren district steel plants and Dilworth-Porter Co., Pittsburgh.

TRADE NOTES

Foote Mineral Co. has completed a three-story fireproof grinding unit and warehouse at Queen Street and Mermaid Lane, Philadelphia.

General Electric Co. has announced that central plant air conditioning and industrial refrigeration equipment of more than 5 hp. will henceforth be sold directly to authorized contractors who, together with engineers and architects, will assume all application engineering and installation functions. Stuart M. Crocker, manager of the air conditioning and commercial refrigeration department, Bloomfield, N. J., has appointed Samuel Martin, Jr., head of the new contractor sales division.

The Hocks Mfg. Co., 933 S. 2nd Street, Milwaukee, has been formed to produce hydraulic two speed shears for cutting steel, developed by Harry Hocks and his son, Clyde, who have been conducting a welding shop. The new shears will cut material up to ⅜-in. and weigh from 80 lb. and up.

Koppers Co., Pittsburgh, engineering and construction division, has opened a branch in the Southwest to serve the oil and gas industries. W. A. Leech, Jr., for a number of years engaged in research and plant construction and operation for Koppers, is in charge of the office, which has been opened in the National Bank of Tulsa Bldg., Tulsa, Okla.

Contract Engineering Corp. is the new name adopted effective March 1 by Contract Welders, Inc., 2545 East 79th Street, Cleveland, designer and builder of machinery and industrial and power piping and custom welding.

FINANCIAL NOTES

Laclede Steel Co., St. Louis, reports net profits for 1939 were $210,053, equal to $1.02 a share, as compared with $331,849, or $1.61 a share in 1938.

Briggs & Stratton Corp., Milwaukee, showed a profit for 1939 of $943,800 or $3.15 per share on 299,996 shares of capital stock. This compares with a profit of $642,113 or $2.14 a share in 1938.

The Harnischfeger Corp., Milwaukee, reported net profit for 1939 of $173,000 compared to a loss of $335,000 in 1938. Walter Harnischfeger, president, stated that despite increased operations requiring more working capital for inventory and work in progress, the company further reduced its bank loans by $180,000, leaving a balance of $685,000. While other divisions showed profits, the welding division operated at a loss due to expenses in coinection with redesigning the lines.

Sharon Steel Corp. reports 1939 net profit of $255,497 after all charges, compared with net loss of $95,324 for 1938.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Feb. 27 for two 2-ton portable gooseneck cranes, with hoist (Schedule 737); until March 1 two lathe attachment grinders (Schedule 758), three drilling machines (Schedule 756), one head-stock, floor-type wood-turning lathe (Schedule 738), 12 sensitive bench-type drilling machines (Schedule 757), all motor-driven, for Alameda, Cal., Naval Air Station; until Feb. 27 for 17,240 ft. of plow steel wire rope (Schedule 732); until March 1, one automatic, storage battery charging equipment (Schedule 752) for Mare Island Navy Yard.

Pig Iron Output Off 12.2%

PRODUCTION of coke pig iron in February totaled 3,311,480 net tons, compared with 4,032,022 tons in January. On a daily basis February output dropped 12.2 per cent from that in January, or from 130,061 net tons in January to 114,189 net tons in February. To conform with the new practice of the American Iron and Steel Institute, all figures are now reported in net tons. The rate of operation dropped 9.5 points last month to 74.9 per cent of the industry's capacity from 84.4 per cent in January.

There were 157 furnaces in blast on March 1, compared with 177 in operation on Feb. 1, a net loss of 20. These 157 furnaces were operating at the rate of 106,040 net tons daily, compared with 123,990 tons on Feb. 1. Twenty-seven furnaces were blown out or banked and seven were put in operation. United States Steel Corp. blew out or banked 14 units and put three in blast. Independent producers blew out or banked eight and put three in operation, and merchant producers blew one in and took five off blast.

Among the furnaces blown out or banked were: Harriet Y, Wickwire-Spencer Steel Co.; Mystic unit of Mystic Iron Works; one Bethlehem, Bethlehem Steel Co.; two Carie, one Clairton, one Duquesne, two Ohio, one South Chicago (new) and one South Chicago (old), four Gary, Carnegie-Illinois Steel Corp.; one Monongahela and one Lorain, National Tube Co.; one Eliza, Jones & Laughlin Steel Corp.; one Midland, Pittsburgh Crucible Steel Co.; one Monessen, Pittsburgh Steel Co.; one Anna, Struthers Iron & Steel Co.; one Jeannette, Youngstown Sheet & Tube Co.; one Shenango, Shenango Furnace Co.; Martin's Ferry, Wheeling Steel Corp.; one Betty, Republic Steel Corp.; one Madeline, Inland Steel Co., and one Zenith, Interlake Iron Corp.

Furnaces blown in included: one Steelton and one Cambria, Bethlehem Steel Co.; Riverside, Wheeling Steel Corp.; one Mingo and one Gary, Carnegie-Illinois Steel Corp.; one Lorain, National Tube Co.; and the Rockdale furnace of Tennessee Products Corp.

Production of Coke Pig Iron and Ferromanganese

Net Tons

	Pig Iron*		Ferromanganese†	
	1940	1939	1940	1939
January	4,032,022	2,436,474	43,240	23,302
February	3,311,480	2,307,409	38,720	20,894
March	.....	2,681,969	....	17,928
April	.....	2,302,918	....	12,900
May	.....	1,923,618	....	8,835
June	.....	2,372,665	....	18,611
½ year	.....	14,025,053	....	102,470
July	.....	2,639,022	....	23,758
August	.....	2,978,991	....	23,103
September	.....	3,223,983	....	24,583
October	.....	4,062,901	....	26,817
November	.....	4,166,888	....	33,999
December	.....	4,220,536	....	40,654
Year	.....	35,317,374	....	275,384

*These totals do not include charcoal pig iron.
†Included in pig iron figures.

Daily Average Production of Coke Pig Iron

Net Tons

	1940	% Capacity	1939	% Capacity	1938
January	130,061	85.4	78,596	51.5	51,632
February	114,189	74.9	82,407	54.0	51,931
March	.....	...	86,516	56.8	52,476
April	.....	...	76,764	50.4	51,376
May	.....	...	62,052	40.8	45,343
June	.....	...	79,089	51.7	39,648
½ year	.....	...	77,486	...	48,717
July	.....	...	85,130	55.8	43,417
August	.....	...	96,696	62.9	53,976
September	.....	...	107,466	70.4	62,737
October	.....	...	131,961	85.9	74,147
November	.....	...	138,877	90.9	84,746
December	.....	...	136,146	89.4	79,872
Year	.....	...	96,760	...	57,633

Merchant Iron Made, Daily Rate

Net Tons

	1940	1939	1938	1937	1936
January	16,475	11,875	11,911	18,039	11,801
February	14,773	10,793	9,916	18,496	12,652
March	....	10,025	9,547	18,432	12,131
April	....	9,529	9,266	16,259	15,565
May	....	7,883	7,203	21,821	14,352
June	....	8,527	6,020	17,774	15,914
July	....	9,404	6,154	21,962	13,013
August	....	11,225	7,408	19,971	13,606
September	....	12,648	12,550	22,473	14,029
October	....	16,409	12,095	21,224	15,282
November	....	16,642	14,793	17,541	16,508
December	....	16,912	10,226	12,280	16,634

Production by Districts and Coke Furnaces in Blast

FURNACES	Production (Net Tons) February (29 Days)	Production (Net Tons) January (31 Days)	March 1 Number in Blast	March 1 Operating Rate, Tons a Day	February 1 Number in Blast	February 1 Operating Rate, Tons a Day
New York:						
Buffalo	213,434	237,096	9	6,955	10	7,040
Other New York and Mass.	.....	16,068	0	.....	1	520
Pennsylvania:						
Lehigh Valley	80,040	90,862	5	2,725	6	3,155
Spiegeleisen	11,228	11,710	2	385	2	275
Schuylkill Valley	42,149	50,223	3	1,455	3	1,620
Susquehanna and Lebanon Valleys	34,681	31,443	2	1,615	1	1,020
Ferromanganese	2,985	3,138	1	105	1	100
Pittsburgh District	756,083	920,397	30	22,870	38	29,105
Ferro. and Spiegel	15,480	18,573	3	535	3	600
Shenango Valley	34,932	57,547	2	945	3	1,560
Western Pennsylvania	116,716	121,662	7	4,025	6	3,925
Ferro. and Spiegel	14,298	17,741	1	495	1	570
Maryland	186,047	194,825	6	6,415	6	6,285
Wheeling District	141,587	152,489	7	5,010	6	4,585
Ohio:						
Mahoning Valley	231,169	398,651	9	7,010	13	10,285
Central and Northern	261,465	298,481	13	9,140	14	9,625
Southern	58,653	61,198	5	2,025	5	1,975
Illinois and Indiana	649,656	815,642	22	18,690	28	24,895
Michigan and Minnesota	128,090	144,660	6	4,165	7	4,665
Colorado, Missouri and Utah.	55,136	63,907	4	1,900	4	2,060
The South:						
Virginia	.....	.....	0	.....	0	.....
Ferromanganese	3,347	3,569	1	115	1	120
Kentucky	12,514	29,510	1	430	1	475
Alabama	257,500	292,412	16	8,880	17	9,430
Ferro. and Spiegel	2,610	218	1	90	0	.....
Tennessee	1,680	.....	1	60	0	.....
Total	3,311,480	4,032,022	157	106,040	177	123,990

C-I Moves Mingo Plant Blooming Mill to Donora

PITTSBURGH — Carnegie-Illinois Steel Corp.'s blooming mill at its Mingo Junction, Ohio, plant is to be relocated at the Donora works of the American Steel & Wire Co. within the next month. Cost of transferring will approximate $300,000. The Mingo Junction plant now produces pig iron only, the rolling of steel products having been suspended about a year ago.

Basing Points Arranged For Buyers' Convenience

WITH this issue THE IRON AGE publishes an insert (opposite) giving all of the basing points for steel, pig iron, ferromanganese, etc., arranged by products and geographically for the convenience of the buyer. Additional copies may be obtained by subscribers upon request.

Basing Points By Products

AXLES—Rolled or Forged
Birmingham
Chicago
Pittsburgh

BARS—Alloy Steel, Hot Rolled
Bethlehem
Buffalo
Canton
Chicago
Massillon
Pittsburgh

BARS—Alloy Steel, Cold Finished
Buffalo
Chicago
Cleveland
Gary
Pittsburgh

BARS AND SMALL SHAPES—Carbon Steel, Hot Rolled
Birmingham
Buffalo
Chicago
Cleveland
Duluth
Gary
Pittsburgh
Gulf Ports:
New Orleans
Beaumont, Tex.
Galveston, Tex.
Houston, Tex.
Orange, Tex.
Port Arthur, Tex.
Pacific Coast Ports:
Long Beach, Cal.
Los Angeles
Oakland, Cal.
Sacramento, Cal.
San Diego, Cal.
San Francisco
San Pedro, Cal.
Stockton, Cal.
Wilmington, Cal.
Portland, Ore.
Bellingham, Wash.
Everett, Wash.
Seattle, Wash.
Tacoma, Wash.

BARS—Carbon Steel, Cold Finished
Buffalo
Cleveland
Detroit
Chicago
Gary
Pittsburgh

BARS—Concrete Reinforcing, New Billet
Birmingham
Buffalo
Chicago
Cleveland
Gary
Pittsburgh
Sparrows Point, Md.
Youngstown
Gulf Ports:
New Orleans
Beaumont, Tex.
Galveston, Tex.
Houston, Tex.
Orange, Tex.
Port Arthur, Tex.
Pacific Coast Ports:
Long Beach, Cal.
Los Angeles
Oakland, Cal.
Sacramento, Cal.
San Diego, Cal.
San Francisco
San Pedro, Cal.
Stockton, Cal.
Wilmington, Cal.
Portland, Ore.
Bellingham, Wash.
Everett, Wash.
Seattle, Wash.
Tacoma, Wash.

BARS, BILLETS, BLOOMS, MUCK BAR—Iron
Berwick, Pa.
Burnham, Pa.
Chicago
Coatesville, Pa.
Columbia, Pa.
Creighton, Pa.
Cuyahoga Falls, Ohio.
Dover, N. J.
Jersey City, N. J.
Knoxville, Tenn.
Lebanon, Pa.
Louisville, Ky.
Pittsburgh
Richmond, Va.
Terre Haute, Ind.

BARS—Low Alloy, High Tensile
Bethlehem
Buffalo
Canton
Chicago
Gary
Massillon
Pittsburgh

BAR SHAPES—Low Alloy, High Tensile
Bethlehem
Buffalo
Chicago
Gary
Pittsburgh
Gulf Ports:
New Orleans
Beaumont, Tex.
Galveston, Tex.
Houston, Tex.
Orange, Tex.
Port Arthur, Tex.
Pacific Coast Ports:
Long Beach, Cal.
Los Angeles
Oakland, Cal.
Sacramento, Cal.
San Diego, Cal.
San Francisco
San Pedro, Cal.
Stockton, Cal.
Wilmington, Cal.
Portland, Ore.
Bellingham, Wash.
Everett, Wash.
Seattle, Wash.
Tacoma, Wash.

BARS AND BAR SHAPES—Medium Manganese
Birmingham
Buffalo
Chicago
Cleveland
Gary
Pittsburgh
Gulf Ports:
New Orleans
Beaumont, Tex.
Galveston, Tex.
Houston, Tex.
Orange, Tex.
Port Arthur, Tex.
Pacific Coast Ports:
Long Beach, Cal.
Los Angeles
Sacramento, Cal.
San Diego, Cal.
San Francisco
San Pedro, Cal.
Stockton, Cal.
Wilmington, Cal.
Portland, Ore.
Bellingham, Wash.
Everett, Wash.
Seattle, Wash.
Tacoma, Wash.

BARS—Merchant, Rail Steel
Birmingham
Buffalo
Chicago
Cleveland
Duluth
Gary
Pittsburgh
Sparrows Point, Md.
Gulf Ports:
New Orleans
Beaumont, Tex.
Galveston, Tex.
Houston, Tex.
Orange, Tex.
Port Arthur, Tex.
Pacific Coast Ports:
Long Beach, Cal.
Los Angeles
Oakland, Cal.
Sacramento, Cal.
San Diego, Cal.
San Francisco
San Pedro, Cal.
Stockton, Cal.
Wilmington, Cal.
Portland, Ore.
Bellingham, Wash.
Everett, Wash.
Seattle, Wash.
Tacoma, Wash.

BARS AND BILLETS—Tool Steel, Carbon, High Speed, etc.
Bethlehem
Pittsburgh
Syracuse, N. Y.

BARS AND BILLETS—Tool Steel, Broaching and Channeller, Hollow and Solid Drill
Bethlehem
Pittsburgh

BARS AND BILLETS, INGOTS—Nitralloy
Pittsburgh

BARS—Special Nickel Steel
Pittsburgh

BARS AND FORGING BILLETS—Stainless Steel
Pittsburgh

BLOOMS, BILLETS AND SLABS—Alloy Steel
Bethlehem
Buffalo
Canton
Chicago
Massillon
Pittsburgh

BLOOMS, BILLETS AND SLABS—Carbon Steel
Birmingham
Buffalo
Chicago
Cleveland
Duluth (Billets only)
Gary
Pittsburgh
Sparrows Point, Md. (Rerolling only)
Youngstown

FERROMANGANESE
Baltimore
Mobile, Ala.
New Orleans
New York
Philadelphia

GIRDER RAILS AND SPLICE BARS THEREFOR
Lorain, Ohio.
Steelton, Pa.

LIGHT RAILS—(60 lb. or less per yd.)—Splice Bars and Angle Bars therefor
Birmingham
Chicago
Pittsburgh

PIG IRON—No. 2 Foundry
Bethlehem
Birdsboro
Birmingham
Buffalo
Chicago
Cleveland
Detroit
Duluth
Erie, Pa.
Everett, Mass.
Granite City, Ill.
Hamilton, Ohio
Jackson, Ohio
Neville Island, Pa.
Provo, Utah
Sharpsville, Pa.
Sparrows, Point, Md.
Swedeland, Pa.
Toledo, Ohio
Youngstown

PIG IRON—Malleable
Bethlehem
Birdsboro
Buffalo
Chicago
Cleveland
Detroit
Duluth
Erie, Pa.
Everett, Mass.
Granite City, Ill.
Hamilton, Ohio
Jackson, Ohio
Neville Island, Pa.
Sharpsville, Pa.
Swedeland, Pa.
Toledo, Ohio
Youngstown

PIG IRON—Open Hearth Basic
Bethlehem
Birdsboro
Birmingham
Buffalo
Chicago
Cleveland
Detroit
Erie, Pa.
Everett, Mass.
Granite City, Ill.
Hamilton, Ohio
Jackson, Ohio
Neville Island, Pa.
Provo, Utah
Sharpsville, Pa.
Sparrows Point, Md.
Steelton, Pa.
Swedeland, Pa.
Toledo, Ohio
Youngstown

PIG IRON—Bessemer
Bethlehem, Pa.
Birdsboro, Pa.
Birmingham
Buffalo
Chicago
Cleveland
Detroit
Duluth
Erie, Pa.
Everett, Mass.
Hamilton, Ohio
Neville Island, Pa.
Sharpsville, Pa.
Swedeland, Pa.
Toledo, Ohio
Youngstown

PIG IRON—Low Phosphorus
Birdsboro, Pa.
Buffalo
Jackson, Ohio
Steelton, Pa.

PIG IRON—Silvery
Jackson, Ohio
Sparrows Point, Md.

PIPE—Wrought Iron
Pittsburgh

PIPE—Steel, Standard and Line
Gary
Lorain
Pittsburgh

PIPE—Steel, Oil Country Tubular Products
Gary
Lorain
Pittsburgh

PLATES—Carbon, Low Alloy, High Tensile and Medium Manganese
Birmingham
Chicago
Claymont, Del. (Carbon and Med. Mn. only)
Cleveland (Carbon and Med. Mn. only)
Coatesville, Pa. (Carbon and Med. Mn. only)
Gary
Pittsburgh
Sparrows Point, Md.
Youngstown (Carbon and Med. Mn. only)
Gulf Ports:
New Orleans
Beaumont, Tex.
Galveston, Tex.
Houston, Tex.
Orange, Tex.
Port Arthur, Tex.
Pacific Coast Ports:
Long Beach, Cal.
Los Angeles
Oakland, Cal.
Sacramento, Cal.
San Diego, Cal.
San Francisco
San Pedro, Cal.
Stockton, Cal.
Wilmington, Cal.
Portland, Ore.
Bellingham, Wash.
Everett, Wash.
Seattle, Wash.
Tacoma, Wash.

PLATES—Nitralloy and St Steel
Pittsburgh

RAILS—Standard Tee (over per yd.) and Splice Bars T (only on sales to Railroad panies and in lots 200 gr rails and over)
Gulf Ports:
New Orleans
Mobile, Ala.
Galveston, Tex.
Houston, Tex.
Pacific Coast Ports:
Oakland, Cal.
San Francisco
San Pedro, Cal.
Portland, Ore.
Seattle, Wash.

RAILROAD TIE PLATE Standard Tee Rails
Birmingham
Buffalo
Chicago
Kansas City, Mo.
Minnequa, Colo.
Pittsburgh
Portsmouth, Ohio
Steelton, Pa.
St. Louis
Weirton, W. Va.
Pacific Coast Ports:
Long Beach, Cal.
Los Angeles
Oakland, Cal.
Sacramento, Cal.
San Diego, Cal.
San Francisco
San Pedro, Cal.
Stockton, Cal.
Wilmington, Cal.
Portland, Ore.
Bellingham, Wash.
Everett, Wash.
Seattle, Wash.
Tacoma, Wash.

RAILROAD TRACK BOLT
Birmingham
Chicago
Cleveland
Pittsburgh
Pacific Coast Ports:
San Francisco
San Pedro, Cal.
Portland, Ore.
Seattle, Wash.

RAILROAD TRACK SP Regular
Birmingham
Chicago
Kansas City, Mo.
Lebanon, Pa.
Minnequa, Colo.
Pittsburgh
Portsmouth, Ohio
Richmond, Va.
St. Louis
Weirton, W. Va.
Youngstown
Pacific Coast Ports:
San Francisco
San Pedro, Cal.
Oakland, Cal.
Wilmington, Cal.
Portland, Ore.
Seattle, Wash.
Tacoma, Wash.

RAILROAD TRACK SP Screw
Chicago
Cleveland
Pittsburgh

SHEET BARS
Buffalo
Canton
Chicago
Cleveland
Pittsburgh
Sparrows Point, Md.
Youngstown

BLOOMS, BILLETS AND SLABS —Alloy Steel

Bethlehem
Buffalo
Canton
Chicago
Massillon
Pittsburgh

BLOOMS, BILLETS AND SLABS —Carbon Steel

Birmingham
Buffalo
Chicago
Cleveland
Duluth (Billets only)
Gary
Pittsburgh
Sparrows Point, Md. (Rerolling only)
Youngstown

FERROMANGANESE

Baltimore
Mobile, Ala.
New Orleans
New York
Philadelphia

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Steelton, Pa.

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Chicago
Pittsburgh

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Cleveland
Detroit
Duluth
Erie, Pa.
Everett, Mass.
Granite City, Ill.
Hamilton, Ohio
Jackson, Ohio
Neville Island, Pa.
Provo, Utah
Sharpsville, Pa.
Sparrows, Point, Md.
Swedeland, Pa.
Toledo, Ohio
Youngstown

PIG IRON—Malleable

Bethlehem
Birdsboro
Buffalo
Chicago
Cleveland
Detroit
Duluth
Erie, Pa.
Everett, Mass.
Granite City, Ill.
Hamilton, Ohio
Jackson, Ohio
Neville Island, Pa.
Sharpsville, Pa.
Swedeland, Pa.
Toledo, Ohio
Youngstown

PIG IRON—Open Hearth Basic

Bethlehem
Birdsboro
Birmingham
Buffalo
Chicago
Cleveland
Detroit
Erie, Pa.
Everett, Mass.
Granite City, Ill.
Hamilton, Ohio
Jackson, Ohio
Neville Island, Pa.
Provo, Utah
Sharpsville, Pa.
Sparrows Point, Md.
Steelton, Pa.
Swedeland, Pa.
Toledo, Ohio
Youngstown

PIG IRON—Bessemer

Bethlehem, Pa
Birdsboro, Pa.
Birmingham
Buffalo
Chicago
Cleveland
Detroit
Duluth
Erie, Pa.
Everett, Mass.
Hamilton, Ohio
Neville Island, Pa.
Sharpsville, Pa.
Swedeland, Pa.
Toledo, Ohio
Youngstown

PIG IRON—Low Phosphorus

Birdsboro, Pa.
Buffalo
Jackson, Ohio
Steelton, Pa.

PIG IRON—Silvery

Jackson, Ohio
Sparrows Point, Md.

PIPE—Wrought Iron

Pittsburgh

PIPE—Steel, Standard and Line

Gary
Lorain
Pittsburgh

PIPE—Steel, Oil Country Tubular Products

Gary
Lorain
Pittsburgh

PLATES—Carbon, Low Alloy, High Tensile and Medium Manganese

Birmingham
Chicago
Claymont, Del. (Carbon and Med. Mn. only)
Cleveland (Carbon and Med. Mn. only)
Coatesville, Pa. (Carbon and Med. Mn. only)
Gary
Pittsburgh
Sparrows Point, Md.
Youngstown (Carbon and Med. Mn. only)
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New Orleans
Beaumont, Tex.
Galveston, Tex.
Houston, Tex.
Orange, Tex.
Port Arthur, Tex.
Pacific Coast Ports:
Long Beach, Cal.
Los Angeles
Oakland, Cal.
Sacramento, Cal.
San Diego, Cal.
San Francisco
San Pedro, Cal.
Stockton, Cal.
Wilmington, Cal.
Portland, Ore.
Bellingham, Wash.
Everett, Wash.
Seattle, Wash.
Tacoma, Wash.

PLATES—Nitralloy and Stainless Steel

Pittsburgh

RAILS—Standard Tee (over 60 lb. per yd.) and Splice Bars Therefor (only on sales to Railroad Companies and in lots 200 gross ton rails and over)

Gulf Ports:
New Orleans
Mobile, Ala.
Galveston, Tex.
Houston, Tex.
Pacific Coast Ports:
Oakland, Cal.
San Francisco
San Pedro, Cal.
Portland, Ore.
Seattle, Wash.

RAILROAD TIE PLATES—for Standard Tee Rails

Birmingham
Buffalo
Chicago
Kansas City, Mo.
Minnequa, Colo.
Pittsburgh
Portsmouth, Ohio
Steelton, Pa.
St. Louis
Weirton, W. Va.
Pacific Coast Ports:
Long Beach, Cal.
Los Angeles
Oakland, Cal.
Sacramento, Cal.
San Diego, Cal.
San Francisco
San Pedro, Cal.
Stockton, Cal.
Wilmington, Cal.
Portland, Ore.
Bellingham, Wash.
Everett, Wash.
Seattle, Wash.
Tacoma, Wash.

RAILROAD TRACK BOLTS

Birmingham
Chicago
Cleveland
Pittsburgh
Pacific Coast Ports:
San Francisco
San Pedro, Cal.
Portland, Ore.
Seattle, Wash.

RAILROAD TRACK SPIKES—Regular

Birmingham
Chicago
Kansas City, Mo.
Lebanon, Pa.
Minnequa, Colo.
Pittsburgh
Portsmouth, Ohio
Richmond, Va.
St. Louis
Weirton, W. Va.
Youngstown
Pacific Coast Ports:
San Francisco
San Pedro, Cal.
Oakland, Cal.
Wilmington, Cal.
Portland, Ore.
Seattle, Wash.
Tacoma, Wash.

RAILROAD TRACK SPIKES—Screw

Chicago
Cleveland
Pittsburgh

SHEET BARS

Buffalo
Canton
Chicago
Cleveland
Pittsburgh
Sparrows Point, Md.
Youngstown

B

SHEETS—Co Low Allo

Buffalo
*Chicago
*Cleveland
Gary
*Granite City
*Middletown,
Pittsburgh
*Youngstown
Pacific Coast
Long Beach
Los Angele
Oakland, C
Sacramento
San Diego,
San Franci
San Pedro,
Stockton, C
Wilmington
Portland, C
Bellingham,
Everett, Wa
Seattle, Wa
Tacoma, W

* Carbon Ste
No asterisk-

SHEETS—Ele

Pittsburgh
Granite City,
Pacific Coast
Long Beach
Los Angele
Oakland, C
Sacramento
San Diego,
San Franci
San Pedro,
Stockton, C
Wilmington
Portland, C
Bellingham
Everett, Wa
Seattle, Wa
Tacoma, W

SHEETS—Ho Low Alloy, Medium

Birmingham
Buffalo
*Chicago
**Cleveland
Gary
**Granite Cit
**Middletown
Pittsburgh
Sparrows Poi
**Youngstown
Pacific Coast
Long Beach
Los Angele
Oakland, C
Sacramento
San Diego,
San Franci
San Pedro,
Stockton, C
Wilmington
Portland, C
Bellingham
Everett, W
Seattle, Wa
Tacoma, W

* Carbon St
** Carbon St
ganese
No asteris

SHEETS—Ga Low All

Birmingham
Buffalo
*Chicago

Basing Points For Steel and Pig Iro

HEETS—Cold Rolled, Carbon and Low Alloy, High Tensile
uffalo
Chicago
Cleveland
ary
Granite City, Ill.
Middletown, Ohio
ittsburgh
Youngstown
acific Coast Ports:
Long Beach, Cal.
Los Angeles
Oakland, Cal.
Sacramento, Cal.
San Diego, Cal.
San Francisco
San Pedro, Cal.
Stockton, Cal.
Wilmington, Cal.
Portland, Ore.
Bellingham, Wash.
Everett, Wash.
Seattle, Wash.
Tacoma, Wash.

Carbon Steel only
No asterisk—both

HEETS—Electrical
ittsburgh
ranite City, Ill.
acific Coast Ports:
Long Beach, Cal.
Los Angeles
Oakland, Cal.
Sacramento, Cal.
San Diego, Cal.
San Francisco
San Pedro, Cal.
Stockton, Cal.
Wilmington, Cal.
Portland, Ore.
Bellingham, Wash.
Everett, Wash.
Seattle, Wash.
Tacoma, Wash.

HEETS—Hot Rolled, Carbon, ow Alloy, High Tensile and Medium Manganese Steel
irmingham
uffalo
Chicago
*Cleveland
ary
*Granite City, Ill.
*Middletown, Ohio
ittsburgh
parrows Point, Md.
*Youngstown
acific Coast Ports:
Long Beach, Cal.
Los Angeles
Oakland, Cal.
Sacramento, Cal.
San Diego, Cal.
San Francisco
San Pedro, Cal.
Stockton, Cal.
Wilmington, Cal.
Portland, Ore.
Bellingham, Wash.
Everett, Wash.
Seattle, Wash.
Tacoma, Wash.

* Carbon Steel only
* Carbon Steel and Medium Manganese steel only
No asterisk—all

SHEETS—Galvanized, Carbon and Low Alloy, High Tensile
Birmingham
Buffalo
Chicago
Gary
*Granite City, Ill.
*Middletown, Ohio
Pittsburgh
Sparrows Point, Md.
Youngstown
Pacific Coast Ports:
Long Beach, Cal.
Los Angeles
Oakland, Cal.
Sacramento, Cal.
San Diego, Cal.
San Pedro, Cal.
San Francisco
Stockton, Cal.
Wilmington, Cal.
Portland, Ore.
Bellingham, Wash.
Everett, Wash.
Seattle, Wash.
Tacoma, Wash.

* Carbon Steel only
No asterisk—both

SHEETS—Galvanized Copper Iron Culvert
Birmingham
Chicago
Gary
Granite City, Ill.
Pittsburgh
Pacific Coast Ports:
Long Beach, Cal.
Los Angeles
Oakland, Cal.
Sacramento, Cal.
San Diego, Cal.
San Francisco
San Pedro, Cal.
Stockton, Cal.
Wilmington, Cal.
Portland, Ore.
Bellingham, Wash.
Everett, Wash.
Seattle, Wash.
Tacoma, Wash.

SHEETS—Long Terne
Gary
Pittsburgh

SHEETS—Porcelain Enameling
Chicago
Cleveland
Gary
Granite City, Ill.
Middletown, Ohio.
Pittsburgh
Youngstown
Pacific Coast Ports:
Long Beach, Cal.
Los Angeles
Oakland, Cal.
Sacramento, Cal.
San Diego, Cal.
San Francisco
San Pedro, Cal.
Stockton, Cal.
Wilmington, Cal.
Portland, Ore.
Bellingham, Wash.
Everett, Wash.
Seattle, Wash.
Tacoma, Wash.

SHEETS—Hot Rolled Nitralloy Steel
Pittsburgh

SHEETS—Red Hard
Chicago
Gary
Pittsburgh
Pacific Coast Ports:
Long Beach, Cal.
Los Angeles
Oakland, Cal.
Sacramento, Cal.
San Diego, Cal.
San Francisco
San Pedro, Cal.
Stockton, Cal.
Wilmington, Cal.
Portland, Ore.
Bellingham, Wash.
Everett, Wash.
Seattle, Wash.
Tacoma, Wash.

SHEETS—Hot Rolled Stainless Steel
Pittsburgh

SPIEGELEISEN
New York
Philadelphia
Baltimore
New Orleans
Palmerton, Pa.

STRIP STEEL—Cold Rolled Carbon
Chicago
Cleveland
Pittsburgh
Worcester, Mass.
Youngstown

STRIP STEEL—Commodity Cold Rolled
Pittsburgh
Chicago
Cleveland
Youngstown
Worcester, Mass.

STRIP STEEL — Cold Rolled Nitralloy
Pittsburgh

STRIP STEEL—Cold Rolled Stainless
Pittsburgh

STRIP STEEL—Hot Rolled, Carbon, Low Alloy, High Tensile and Medium Manganese Steel
Birmingham
*Buffalo
Chicago
**Cleveland
Gary
**Middletown, Ohio
Pittsburgh
**Youngstown
Pacific Coast Ports:
Long Beach, Cal.
Los Angeles
Oakland, Cal.
Sacramento, Cal.
San Diego, Cal.
San Francisco
San Pedro, Cal.
Stockton, Cal.
Wilmington, Cal.
Portland, Ore.
Bellingham, Wash.
Everett, Wash.
Seattle, Wash.
Tacoma, Wash.

* Low Alloy, High Tensile Steel only
** Carbon and Medium Manganese Steel only
No asterisk—all

STRIP STEEL — Hot Rolled Nitralloy
Pittsburgh

STRIP STEEL — Hot Rolled Stainless
Pittsburgh

SKELP—Hot Rolled Carbon Steel
Chicago
Coatesville, Pa.
Pittsburgh
Sparrows Point, Md.
Youngstown

SKELP—Charcoal Iron
Coatesville, Pa.

STEEL SHEET PILING A CESSORIES—New, Use Rental (Piling onl
Buffalo
Chicago
Pittsburgh
*Miami, Fla.
*Tampa, Fla.
Gulf Ports:
Mobile, Ala.
Lake Charles, La.
New Orleans, La.
Baytown, Tex.
Beaumont, Tex.
Corpus Christi, Tex.
Galveston, Tex.
Houston, Tex.
Orange, Tex.
Port Arthur, Tex.
Pacific Coast Ports:
Long Beach, Cal.
Los Angeles
Oakland, Cal.
Sacramento, Cal.
San Diego, Cal.
San Francisco
San Pedro, Cal.
Stockton, Cal.
Wilmington, Cal.
Portland, Ore.
Bellingham, Wash.
Everett, Wash.
Seattle, Wash.
Tacoma, Wash.

* Used Piling Only

STRUCTURAL SHAPES ard and Wide Flange, Car Alloy, High Tensile and Manganese Steel
Bethlehem
*Birmingham
Buffalo
Chicago
**Gary
Pittsburgh
Gulf Ports:
New Orleans
Beaumont, Tex.
Galveston, Tex.
Houston, Tex.
Orange, Tex.
Port Arthur, Tex.
Pacific Coast Ports:
Long Beach, Cal.
Los Angeles
Oakland, Cal.
Sacramento, Cal.
San Diego, Cal.
San Francisco
San Pedro, Cal.
Stockton, Cal.
Wilmington, Cal.
Portland, Ore.
Bellingham, Wash.
Everett, Wash.
Seattle, Wash.
Tacoma, Wash.

* Standard Shapes, Car Medium Manganese Only.
** Standard Shapes, Car Low Alloy, High Only.

STRUCTURAL SHAPES less Steel
Pittsburgh

Steel and Pig Iron

Supplement to
THE IRON AGE
March 7, 1940

cramento, Cal.
n Diego, Cal.
n Francisco
n Pedro, Cal.
ckton, Cal.
ilmington, Cal.
rtland, Ore.
llingham, Wash.
erett, Wash.
attle, Wash.
coma, Wash.

ETS—Hot Rolled Stainless Steel
burgh

EGELEISEN
York
delphia
more
Orleans
erton, Pa.

P STEEL—Cold Rolled Carbon
go
land
burgh
ester, Mass.
gstown

P STEEL—Commodity Cold Rolled
burgh
go
land
gstown
ester, Mass.

P STEEL — Cold Rolled Nitralloy
burgh

P STEEL—Cold Rolled Stainless
burgh

P STEEL—Hot Rolled, Carbon Low Alloy, High Tensile and Medium Manganese Steel
ingham
alo
go
veland

ddletown, Ohio
burgh
ngstown
e Coast Ports:
g Beach, Cal.
Angeles
land, Cal.
ramento, Cal.
Diego, Cal.
Francisco
Pedro, Cal.
kton, Cal.
mington, Cal.
tland, Ore.
lingham, Wash.
rett, Wash.
ttle, Wash.
oma, Wash.

w Alloy, High Tensile Steel only
rbon and Medium Manganese Steel only
asterisk—all

P STEEL — Hot Rolled Nitralloy
urgh

P STEEL — Hot Rolled Stainless
urgh

P—Hot Rolled Carbon Steel
go
sville, Pa.

Pittsburgh
Sparrows Point, Md.
Youngstown

SKELP—Charcoal Iron
Coatesville, Pa.

STEEL SHEET PILING AND ACCESSORIES—New, Used, and Rental (Piling only)
Buffalo
Chicago
Pittsburgh
*Miami, Fla.
*Tampa, Fla.
Gulf Ports:
Mobile, Ala.
Lake Charles, La.
New Orleans, La.
Baytown, Tex.
Beaumont, Tex.
Corpus Christi, Tex.
Galveston, Tex.
Houston, Tex.
Orange, Tex.
Port Arthur, Tex.
Pacific Coast Ports:
Long Beach, Cal.
Los Angeles
Oakland, Cal.
Sacramento, Cal.
San Diego, Cal.
San Francisco
San Pedro, Cal.
Stockton, Cal.
Wilmington, Cal.
Portland, Ore.
Bellingham, Wash.
Everett, Wash.
Seattle, Wash.
Tacoma, Wash.

* Used Piling Only

STRUCTURAL SHAPES—Standard and Wide Flange, Carbon, Low Alloy, High Tensile and Medium Manganese Steel
Bethlehem
*Birmingham
Buffalo
Chicago
**Gary
Pittsburgh
Gulf Ports:
New Orleans
Beaumont, Tex.
Galveston, Tex.
Houston, Tex.
Orange, Tex.
Port Arthur, Tex.
Pacific Coast Ports:
Long Beach, Cal.
Los Angeles
Oakland, Cal.
Sacramento, Cal.
San Diego, Cal.
San Francisco
San Pedro, Cal.
Stockton, Cal.
Wilmington, Cal.
Portland, Ore.
Bellingham, Wash.
Everett, Wash.
Seattle, Wash.
Tacoma, Wash.

WIRE—Drawn (Includes Manufacturer's and Merchant Quality)
Birmingham
Chicago
Cleveland
Duluth
Glassport, Pa. (Hot copper covered steel only)
Pittsburgh
Worcester, Mass.
Pacific Coast Ports:
Long Beach, Cal.
Los Angeles
Oakland, Cal.
Sacramento, Cal.
San Diego, Cal.
San Francisco
San Pedro, Cal.
Stockton, Cal.
Wilmington, Cal.
Portland, Ore.
Bellingham, Wash.
Everett, Wash.
Seattle, Wash.
Tacoma, Wash.

* Standard Shapes, Carbon and Medium Manganese Steel Only.
** Standard Shapes, Carbon and Low Alloy, High Tensile Only.

STRUCTURAL SHAPES—Stainless Steel
Pittsburgh

TIN PLATE AND SPECIAL COATED MANUFACTURING TERNES
Chicago
Gary
Granite City, Ill.
Pittsburgh

TIN MILL BLACK PLATE
Chicago
Gary
Granite City, Ill.
Pittsburgh
Pacific Coast Ports:
Long Beach, Cal.
Los Angeles
Oakland, Cal.
Sacramento, Cal.
San Diego, Cal.
San Francisco
San Pedro, Cal.
Stockton, Cal.
Wilmington, Cal.
Portland, Ore.
Bellingham, Wash.
Everett, Wash.
Seattle, Wash.
Tacoma, Wash.

TUBE ROUNDS
Chicago
Cleveland
Pittsburgh

TUBES—Boiler, Charcoal Iron and Lapweld Steel
Pittsburgh

TUBING—Rerolled Rail Steel
Pittsburgh

WHEELS—Car, Rolled Steel
Chicago
Pittsburgh

WIRE RODS
Birmingham
Chicago
Cleveland
Pittsburgh
Worcester, Mass.
Gulf Ports:
Galveston, Tex.
Pacific Coast Ports:
Long Beach, Cal.
Los Angeles
Oakland, Cal.
Sacramento, Cal.
San Diego, Cal.
San Francisco
San Pedro, Cal.
Stockton, Cal.
Wilmington, Cal.
Portland, Ore.
Bellingham, Wash.
Everett, Wash.
Seattle, Wash.
Tacoma, Wash.

WIRE—Spring
Chicago
Cleveland
Pittsburgh
Worcester, Mass.
Pacific Coast Ports:
Long Beach, Cal.
Los Angeles
Oakland, Cal.
Sacramento, Cal.
San Diego, Cal.
San Francisco
San Pedro, Cal.
Stockton, Cal.
Wilmington, Cal.
Portland, Ore.
Bellingham, Wash.
Everett, Wash.
Seattle, Wash.
Tacoma, Wash.

WIRE—Telephone
Cleveland
Duluth
Muncie, Ind.
Pittsburgh
Sparrows Point, Md.
Trenton, N. J.
Waukegan, Ill.

WIRE NAILS AND STAPLES, TWISTED BARBLESS AND BARBED WIRE, WIRE FENCING (except Chain Link), BALE TIES
Birmingham
Chicago
Cleveland
Duluth
Pittsburgh
Pacific Coast Ports:
Long Beach, Cal.
Los Angeles
Oakland, Cal.
Sacramento, Cal.
San Diego, Cal.
San Francisco
San Pedro, Cal.
Stockton, Cal.
Wilmington, Cal.
Portland, Ore.
Bellingham, Wash.
Everett, Wash.
Seattle, Wash.
Tacoma, Wash.

WIRE HOOPS
Chicago
Pittsburgh

FENCE POSTS
Birmingham (Angle line posts only)
Chicago
Cleveland
Duluth, Minn.
Pittsburgh
Pacific Coast Ports:
Long Beach, Cal.
Los Angeles
Oakland, Cal.
Sacramento, Cal.
San Diego, Cal.
San Francisco
San Pedro, Cal.
Stockton, Cal.
Wilmington, Cal.
Portland, Ore.
Bellingham, Wash.
Everett, Wash.
Seattle, Wash.
Tacoma, Wash.

———Basing Points, Geograph

BALTIMORE, MD.
Ferromanganese
Spiegeleisen

BERWICK, PA.
Bars, Billets, Blooms, Muck bar—Iron

BETHLEHEM, PA.
Alloy Steel, Hot Rolled
Bars and Billets—Tool Steel
Blooms, Billets and Slabs—Alloy Steel
Pig Iron
Structural Shapes

BIRDSBORO, PA.
Pig Iron

BIRMINGHAM
Axles—Rolled or Forged
Bars and Small Shapes—Carbon Steel and Rail Steel, Hot Rolled
Bars—Concrete Reinforcing, New Billet and Rail Steel
Blooms, Billets and Slabs—Carbon Steel
Light Rails—60 lb. or less per yd.
Pig Iron
Plates—Carbon
Railroad Tie Plates—for Standard Tee Rails
Railroad Track Spikes
Sheets—Hot Rolled
Sheets—Galvanized
Strip Steel—Hot Rolled
Wheels—Car, Rolled Steel
Wire Rods
Wire—Drawn (Includes Manufacturers and Merchants Quality)
Wire Nails and Staples
Twisted Barbless and Barbed Wire
Wire Fencing (except Chain Link)
Bale Ties
Fence Posts (Angle line posts only)

BUFFALO
Bars—Alloy Steel, Hot Rolled
Bars—Alloy Steel, Cold Finished
Bars and Small Shapes—Carbon Steel and Rail Steel, Hot Rolled
Bars—Carbon Steel, Cold Finished
Bars—Concrete Reinforcing, New Billet and Rail Steel
Blooms, Billets and Slabs—Alloy Steel
Blooms, Billets and Slabs—Carbon Steel
Pig Iron
Railroad Tie Plates—for Standard Tee Rails
Sheet Bars
Sheets—Cold Rolled
Sheets—Hot Rolled
Sheets—Galvanized
Steel Sheet Piling and Accessories
Structural Shapes

BURNHAM, PA.
Bars, Billets, Blooms, Muck Bar—Iron

CANTON, OHIO
Bars—Alloy Steel, Hot Rolled
Blooms, Billets and Slabs—Alloy Steel
Sheet Bars

CHICAGO
Axles—Rolled or Forged
Bars—Alloy Steel, Hot Rolled
Bars—Alloy Steel, Cold Finished
Bars and Small Shapes—Carbon Steel and Rail Steel, Hot Rolled
Bars—Carbon Steel, Cold Finishing
Bars—Concrete Reinforcing, New Billet and Rail Steel
Bars, Billets, Blooms, Muck Bar—Iron
Blooms, Billets and Slabs—Alloy Steel
Blooms, Billets and Slabs—Carbon Steel
Light Rails—60 lb. or less per yd.
Pig Iron
Plates—Carbon
Railroad Tie Plates—for Standard Tee Rails
Railroad Track Spikes
Sheet Bars
Sheets—Cold Rolled
Sheets—Hot Rolled
Sheets—Galvanized
Sheets—Long Terne
Strip Steel—Cold Rolled
Strip Steel—Hot Rolled
Skelp—Carbon Steel
Steel Sheet Piling and Accessories
Structural Shapes
Tin Plate and Terne Plate
Tin Mill Black Plate
Wheels—Car, Rolled Steel
Wire Rods
Wire—Drawn (Includes Manufacturers and Merchant Quality)
Wire—Spring
Wire Nails and Staples
Twisted Barbless and Barbed Wire
Wire Fencing (except Chain Link)
Bale Ties
Wire Hoops
Fence Posts

CLAYMONT, DEL.
Plates—Carbon

CLEVELAND
Bars—Alloy Steel, Cold Finished
Bars and Small Shapes—Carbon Steel and Rail Steel, Hot Rolled
Bars—Carbon Steel, Cold Finished
Bars—Concrete Reinforcing, New Billet and Rail Steel
Blooms, Billets and Slabs—Carbon Steel
Pig Iron
Plates—Carbon
Sheet Bars
Sheets—Cold Rolled
Sheets—Hot Rolled
Strip Steel—Cold Rolled
Strip Steel—Hot Rolled
Wire Rods
Wire—Drawn (Includes Manufacturers and Merchant Quality)
Wire—Spring
Wire—Telephone
Wire Nails and Staples
Twisted Barbless and Barbed Wire
Wire Fencing (except Chain Link)
Bale Ties
Fence Posts

COATESVILLE, PA.
Bars, Billets, Blooms, Muck Bar—Iron
Plates—Carbon
Skelp—Carbon Steel
Skelp—Charcoal Iron

COLUMBIA, PA.
Bars, Billets, Blooms, Muck Bar—Iron

graphical

CREIGHTON, PA.
Bars, Billets, Blooms, Muck Bar—Iron

CUYAHOGA FALLS, OHIO
Bars, Billets, Blooms, Muck Bar—Iron

DETROIT
Bars—Carbon Steel, Cold Finished
Pig Iron

DOVER, N. J.
Bars, Billets, Blooms, Muck Bar—Iron

DULUTH
Bars and Small Shapes—Carbon Steel and Rail Steel, Hot Rolled
Blooms, Billets and Slabs—Carbon Steel
Pig Iron
Wire—Drawn (Includes Manufacturers and Merchant Quality)
Wire—Telephone
Wire Nails and Staples
Twisted Barbless and Barbed Wire
Wire Fencing (except Chain Link)
Bale Ties
Fence Posts

ERIE, PA.
Pig Iron

EVERETT, MASS.
Pig Iron

GARY
Bars—Alloy Steel, Cold Finished
Bars and Small Shapes—Carbon Steel and Rail Steel, Hot Rolled
Bars—Carbon Steel, Cold Finished
Bars—Concrete Reinforcing, New Billet and Rail Steel
Blooms, Billets and Slabs—Carbon Steel
Pipe—Steel
Plates—Carbon
Sheets—Cold Rolled
Sheets—Hot Rolled
Sheets—Galvanized
Sheets—Long Terne
Strip Steel—Hot Rolled
Structural Shapes
Tin Plate and Terne Plate
Tin Mill Black Plate

GLASSPORT, PA.
Wire—Drawn (Includes Manufacturers and Merchant Quality)

GRANITE CITY, ILL.
Pig Iron
Sheets—Cold Rolled
Sheets—Hot Rolled
Sheets—Galvanized
Tin Plate and Terne Plate
Tin Mill Black Plate

HAMILTON, OHIO
Pig Iron

JACKSON, OHIO
Pig Iron

JERSEY CITY, N. J.
Bars, Billets, Blooms, Muck Bar—Iron

KANSAS CITY, MO.
Railroad Tie Plates—for Standard Tee Rails
Railroad Track Spikes

KNOXVILLE, TENN.
Bars, Billets, Blooms, Muck Bar—Iron

LEBANON, PA.
Bars, Billets, Blooms, Muck Bar—Iron
Railroad Track Spikes

LORAIN, OHIO
Girder Rails, and Splice Bars therefor
Pipe—Steel

LOUISVILLE, KY.
Bars, Billets, Blooms, Muck Bar—Iron

MASSILLON, OHIO
Bars—Alloy Steel, Hot Finished
Blooms, Billets and Slabs—Alloy Steel

MIDDLETOWN, OHIO
Sheets—Cold Rolled
Sheets—Hot Rolled
Sheets—Galvanized
Strip Steel—Hot Rolled

MINNEQUA, COLO.
Railroad Tie Plates—for Standard Tee Rails
Railroad Track Spikes

MUNCIE, IND.
Wire—Telephone

NEVILLE ISLAND, PA.
Pig Iron

NEW YORK, N. Y.
Ferromanganese
Spiegeleisen

PALMERTON, PA.
Spiegeleisen

PHILADELPHIA, PA.
Ferromanganese
Spiegeleisen

PITTSBURGH
Axles—Rolled or Forged
Bars—Alloy Steel, Hot Rolled
Bars—Alloy Steel, Cold Finished
Bars and Small Shapes—Carbon Steel and Rail Steel, Hot Rolled
Bars—Carbon Steel, Cold Finished
Bars—Concrete Reinforcing, New Billet and Rail Steel
Bars, Billets, Blooms, Muck Bar—Iron
Bars and Billets—Tool Steel
Blooms, Billets and Slabs—Alloy Steel
Blooms, Billets and Slabs—Carbon Steel
Light Rails—60 lb. or less per yd.
Pipe—Wrought Iron
Pipe—Steel
Plates—Carbon
Railroad Tie Plates—for Standard Tee Rails
Railroad Track Spikes
Sheet Bars
Sheets—Cold Rolled
Sheets—Hot Rolled
Sheets—Galvanized
Sheets—Long Terne
Strip Steel—Cold Rolled
Strip Steel—Hot Rolled
Skelp—Carbon Steel
Steel Sheet Piling and Accessories
Structural Shapes
Tin Plate and Terne Plate
Tin Mill Black Plate
Tubes—Boiler
Wheels—Car, Rolled Steel
Wire Rods
Wire—Drawn (Includes Manufacturers and Merchant Quality)
Wire—Spring
Wire—Telephone
Wire Nails and Staples
Twisted Barbless and Barbed Wire
Wire Fencing (except Chain Link)
Bale Ties
Wire Hoops
Fence Posts

PORTSMOUTH, OHIO
Railroad Tie Plates—for Standard Tee Rails
Railroad Track Spikes

PROVO, UTAH
Pig Iron

RICHMOND, VA.
Bars, Billets, Blooms, Muck Bar—Iron
Railroad Track Spikes

ST. LOUIS, MO.
Railroad Tie Plates—for Standard Tee Rails
Railroad Track Spikes

SHARPSVILLE, PA.
Pig Iron

SPARROWS POINT, MD.
Bars—Concrete Reinforcing, New Billet and Rail Steel
Blooms, Billets and Slabs (Carbon Steel)
Pig Iron
Plates—Carbon
Sheet Bars
Sheets—Hot Rolled
Sheets—Galvanized
Skelp—Carbon Steel
Wire—Telephone

STEELTON, PA.
Girder Rails and Splice Bars therefor
Pig Iron
Railroad Tie Plates—for Standard Tee Rails

SWEDELAND, PA.
Pig Iron

SYRACUSE, N. Y.
Bars and Billets—Tool Steel

TERRE HAUTE, IND.
Bars, Billets, Blooms, Muck Bar—Iron

TOLEDO, OHIO
Pig Iron

TRENTON, N. J.
Wire—Telephone

WAUKEGAN, ILL.
Wire—Telephone

WEIRTON, W. VA.
Railroad Tie Plates—for Standard Tee Rails
Railroad Track Spikes

WORCESTER, MASS.
Strip Steel—Cold Rolled
Wire Rods
Wire—Drawn (Includes Manufacturers and Merchant Quality)
Wire—Spring

YOUNGSTOWN, OHIO
Bars—Concrete Reinforcing, New Billet and Rail Steel
Blooms, Billets and Slabs—Carbon Steel
Pig Iron
Plates—Carbon
Railroad Track Spikes
Sheet Bars
Sheets—Cold Rolled
Sheets—Hot Rolled
Sheets—Galvanized
Strip Steel—Cold Rolled
Strip Steel—Hot Rolled
Skelp—Carbon Steel

GULF PORTS:

BAYTOWN, TEX.
Steel Sheet Piling and Accessories

BEAUMONT, TEX.
Bars and Small Shapes—Carbon Steel and Rail Steel, Hot Rolled
Bars—Concrete Reinforcing, New Billet and Rail Steel
Plates—Carbon
Steel Sheet Piling and Accessories
Structural Shapes

CORPUS CHRISTI, TEX.
Steel Sheet Piling and Accessories

GALVESTON, TEX.
Bars and Small Shapes—Carbon Steel and Rail Steel, Hot Rolled
Bars—Concrete Reinforcing, New Billet and Rail Steel
Plates—Carbon
Rails and Splice Bars for rails over 60 lb. per yd.
Steel Sheet Piling and Accessories
Structural Shapes
Wire Rods

HOUSTON, TEX.
Bars and Small Shapes—Carbon Steel and Rail Steel, Hot Rolled
Bars—Concrete Reinforcing, New Billet and Rail Steel
Plates—Carbon
Rails and Splice Bars for rails over 60 lb. per yd.
Steel Sheet Piling and Accessories
Structural Shapes

LAKE CHARLES, LA.
Steel Sheet Piling and Accessories

MOBILE, ALA.
Ferromanganese
Rails and Splice Bars for rails over 60 lb. per yd.
Steel Sheet Piling and Accessories

NEW ORLEANS, LA.
Bars and Small Shapes—Carbon Steel and Rail Steel, Hot Rolled
Bars—Concrete Reinforcing, New Billet and Rail Steel
Ferromanganese
Plates—Carbon
Rails and Splice Bars for rails over 60 lb. per yd.
Spiegeleisen
Steel Sheet Piling and Accessories
Structural Shapes

ORANGE, TEX.
Bars and Small Shapes—Carbon Steel and Rail Steel, Hot Rolled
Bars—Concrete Reinforcing, New Billet and Rail Steel
Plates—Carbon
Steel Sheet Piling and Accessories
Structural Shapes

PORT ARTHUR, TEX.
Bars and Small Shapes—Carbon Steel and Rail Steel, Hot Rolled
Bars—Concrete Reinforcing, New Billet and Rail Steel
Plates—Carbon
Steel Sheet Piling and Accessories
Structural Shapes

PACIFIC COAST PORTS:

BELLINGHAM, WASH.
EVERETT, WASH.
LONG BEACH, CAL.
LOS ANGELES
SACRAMENTO, CAL.
SAN DIEGO, CAL.
STOCKTON, CAL.

Bars and Small Shapes—Carbon Steel and Rail Steel, Hot Rolled
Bars—Concrete Reinforcing, New Billet and Rail Steel
Plates—Carbon
Railroad Tie Plates—for Standard Tee Rails
Sheets—Cold Rolled
Sheets—Hot Rolled
Sheets—Galvanized
Strip Steel—Hot Rolled
Steel Sheet Piling and Accessories
Structural Shapes
Tin Mill Black Plate
Wire Rods
Wire—Drawn (Includes Manufacturers and Merchant Quality)
Wire—Spring
Wire Nails and Staples
Twisted Barbless and Barbed Wire
Wire Fencing (except Chain Link)
Bale Ties
Fence Posts

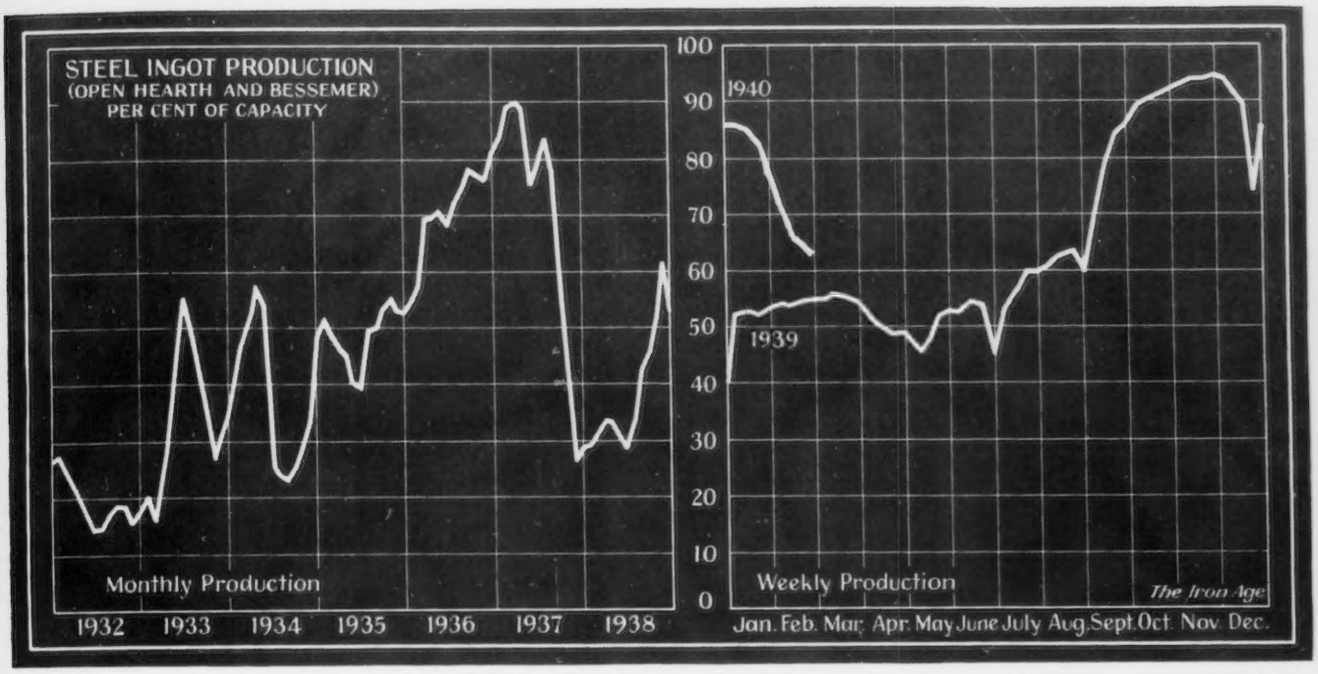
OAKLAND, CAL.
PORTLAND, ORE.
SAN FRANCISCO
SAN PEDRO, CAL.
SEATTLE, WASH.

Bars and Small Shapes—Carbon Steel and Rail Steel, Hot Rolled
Bars—Concrete Reinforcing, New Billet and Rail Steel
Plates—Carbon
Rails and Splice Bars for rails over 60 lb. per yd.
Railroad Tie Plates—for Standard Tee Rails
Railroad Track Spikes
Sheets—Cold Rolled
Sheets—Hot Rolled
Sheets—Galvanized
Strip Steel—Hot Rolled
Steel Sheet Piling and Accessories
Structural Shapes
Tin Mill Black Plate
Wire Rods
Wire—Drawn (Includes Manufacturers and Merchant Quality)
Wire—Spring
Wire Nails and Staples
Twisted Barbless and Barbed Wire
Wire Fencing (except Chain Link)
Bale Ties
Fence Ties

TACOMA, WASH.
WILMINGTON, CAL.

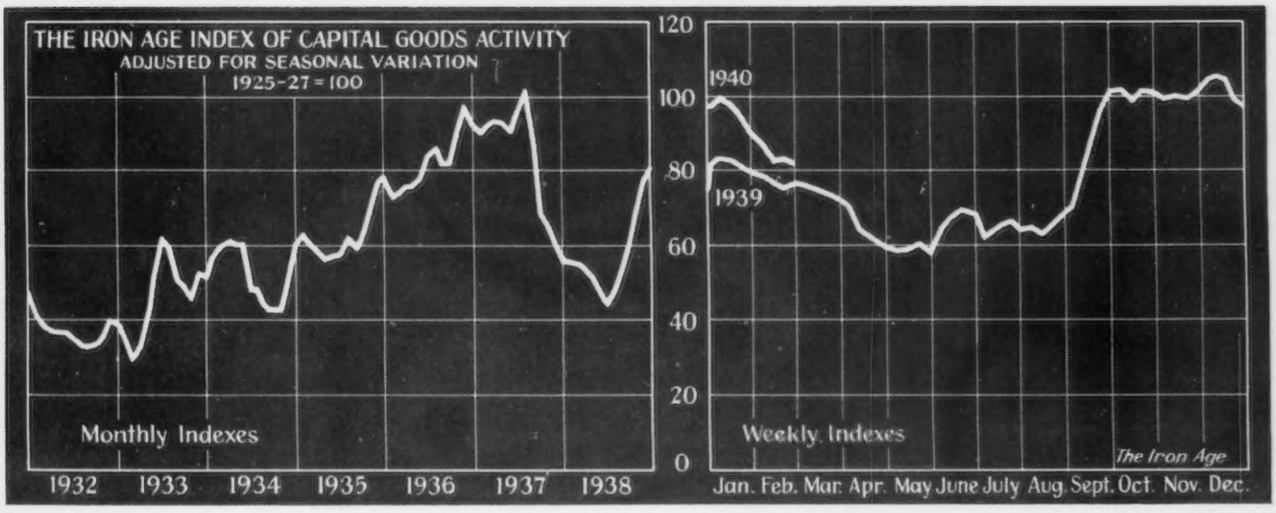
Bars and Small Shapes—Carbon Steel and Rail Steel, Hot Rolled
Bars—Concrete Reinforcing, New Billet and Rail Steel
Plates—Carbon
Railroad Tie Plates—for Standard Tee Rails
Railroad Track Spikes
Sheets—Cold Rolled
Sheets—Hot Rolled
Sheets—Galvanized
Strip Steel—Hot Rolled
Steel Sheet Piling and Accessories
Structural Shapes
Tin Mill Black Plate
Wire Rods
Wire—Drawn (includes Manufacturers and Merchant Quality)
Wire—Spring
Wire Nails and Staples
Twisted Barbless and Barbed Wire
Wire Fencing (except Chain Link)
Bale Ties
Fence Posts

Ingot Rate Drops One and One-Half Points to 63½% of Capacity



District Ingot Production, Per Cent of Capacity	Pitts-burgh	Chicago	Valleys	Phila-delphia	Cleve-land	Buffalo	Wheel-ing	Detroit	Southern	S. Ohio River	Western	St. Louis	East-ern	Aggre-gate
CURRENT WEEK..	62.0	60.0	44.0	61.0	71.0	56.5	84.0	82.5	80.0	51.0	70.0	63.0	50.0	**63.5**
PREVIOUS WEEK..	64.0	59.0	44.0	65.0	68.0	61.5	88.0	95.0	88.0	57.5	80.0	61.5	50.0	**65.0**

Index Shows Moderate Decline



OUTPUT of the capital goods industries as a whole continues to move sidewise, as compared with the rising trend usually experienced at this time of the year. This failure to improve along seasonal lines caused THE IRON AGE capital goods index to decline slightly in the past week, wiping out the small increase recorded in the preceding week. At the close of the past week the index stood at 81.5, as against 83.0 in the previous week and 76.4 in the corresponding week a year ago. Lumber carloadings were up seasonally in the week, as was the Pittsburgh factor. All the other components, however, registered varying losses for the week. The weighted monthly index declined to 84.3 in February from 96.5 in January. In February, 1939, the index was 77.3, while the average for the year 1939 was 78.6. The high for 1939 was 103.5, reached in December.

	Week Ended Mar. 2	Week Ended Feb. 24	Comparable Week 1939	Comparable Week 1929
Steel ingot production[1]	85.1	88.7	73.7	119.3
Automobile production[2]	103.8	108.6	81.1	123.8
Construction contracts[3]	64.6	65.3	105.3	134.7
Forest products carloadings[4]	58.2	57.0	72.7	120.7
Production and shipments, Pittsburgh District[5]	95.6	95.4	49.2	117.0
Combined index	**81.5**	**83.0**	**76.4**	**123.1**

Sources: [1] THE IRON AGE; [2] Ward's Automotive Reports; [3] *Engineering News-Record*; [4] Association of American Railroads; [5] University of Pittsburgh. The indexes of forest products carloadings and activity in the Pittsburgh area reflect conditions as of the week ending Feb. 24. Other indexes cover the week of March 2.

. . . SUMMARY OF THE WEEK . . .

. . . Carnegie-Illinois announced unchanged steel prices for second quarter.

° ° °

. . . Production continues to decline, but new orders are in a little better volume.

° ° °

. . . Pig iron output off in February with net loss of 20 furnaces.

UNCHANGED steel prices for the second quarter were announced on Wednesday by Carnegie-Illinois Steel Corp., which stated that current quotations will apply for all shipments of hot rolled and cold rolled carbon and alloy products up to and including June 30, and that orders for shipment after that date will be invoiced at prices in effect at the date of shipment.

No specific mention of tin plate was made, but the price announcement is interpreted as indicating that there will be no change on that product.

This announcement tends to confirm recent reports of steadiness in domestic steel quotations, but there has been considerable shading in export prices during the past week or two.

Although steel production continues to decline, the coming of March has brought a few encouraging signs. There is as yet no evidence of a strong upward trend in new business, but the moderate improvement noted a week ago has continued, thereby raising hopes that the recession of the past two or three months has been checked.

In three steel producing districts—Chicago, Cleveland and St. Louis—there have been slight gains in operations this week, though these are more than offset by further losses in other districts, including Pittsburgh, Wheeling-Weirton, Eastern Pennsylvania, Buffalo, Detroit, Birmingham and Southern Ohio. In the Youngstown area, where the decline has been the most rapid, the rate is unchanged. At Detroit there has been a very sharp drop due to an accumulation of semi-finished steel. The rate for the industry this week is 63½ per cent, down a point and a half from last week.

Some mills are still operating at rates higher than the volume of incoming business, the difference being accounted for by what remains of the heavy backlogs built up last fall. As these are rapidly disappearing, the mills will soon be obliged to subsist on new business, which must expand considerably during this month and next if the industry rate is not to drop below 60 per cent, which has been generally considered as a probable bottom for the near term.

AMONG the more promising indications of improvement in the steel situation are: The ordering of steel by nearly all automobile makers for quick shipment, indicating an expectation of large automobile production during March and April; the awarding of 36,000 tons of fabricated structural steel, the largest amount reported in one week since January, 1939; the continued good volume of inquiries and orders from foreign countries, which points to an export trade considerably above that of the early part of last year; the issuance of inquiries for shell steel, one for 16,000 tons of billets and 5000 tons of bars having been sent out by a Pittsburgh district company, which is figuring on a British shell contract.

The automobile industry continues to lead the way in domestic activity. Following a February output which was a record for that month since 1929, the industry is planning an output of about 440,000 cars in March. Moreover, automobile companies have started on their tool and die programs for 1941 models, from which it appears that die shops will have one of their busiest years.

ACCOMPANYING the recent downward trend in steel production, pig iron output declined 12.2 per cent in February. Total production was 3,311,480 net tons compared with 4,032,022 net tons in January, while on a daily basis the February output averaged 114,189 net tons compared with 130,061 tons in January. There was a net loss of 20 furnaces during the past month. On March 1 there were 157 in blast compared with 177 on Feb. 1. The rate of operation of available capacity in February was 74.9 per cent compared with 84.4 per cent in January.

The scrap market appears to have about completed its downward trend. While there is a little weakness at Pittsburgh in No. 1 heavy melting steel, this is offset by a modicum of strength at Chicago and a purchase of 25,000 tons by an eastern steel company at the top of the quoted range of prices. THE IRON AGE scrap composite price is unchanged at $16.71 for the third consecutive week.

A Comparison of Prices

Market Prices at Date, and One Week, One Month, and One Year Previous
Advances Over Past Week in Heavy Type, Declines in Italics

Rails and Semi-finished Steel

Per Gross Ton:	Mar. 5, 1940	Feb. 27, 1940	Feb. 6, 1940	Mar. 7, 1939
Rails, heavy, at mill	$40.00	$40.00	$40.00	$40.00
Light rails: Pittsburgh, Chicago, Birmingham	40.00	40.00	40.00	40.00
Rerolling billets: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point.	34.00	34.00	34.00	34.00
Sheet bars: Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point	34.00	34.00	34.00	34.00
Slabs: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point	34.00	34.00	34.00	34.00
Forging billets: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham	40.00	40.00	40.00	40.00
Wire rods: Nos. 5 to 9/32 in., Pittsburgh, Chicago, Cleveland, cents per lb.	2.00	2.00	2.00	1.92
Skelp, grvd. steel: Pittsburgh, Chicago, Youngstown, Coatesville, Sparrows Point, cents per lb.	1.90	1.90	1.90	1.90

Finished Steel

Cents Per Lb.:				
Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham	2.15	2.15	2.15	2.25
Plates: Pittsburgh, Chicago, Gary, Birmingham, Sparrows Point, Cleveland, Youngstown, Coatesville, Claymont	2.10	2.10	2.10	2.10
Structural shapes: Pittsburgh, Chicago, Gary, Buffalo, Bethlehem, Birmingham	2.10	2.10	2.10	2.10
Alloy bars: Pittsburgh, Buffalo, Bethlehem, Massillon or Canton	2.70	2.70	2.70	2.80
Cold finished bars: Pittsburgh, Buffalo, Cleveland, Chicago, Gary	2.65	2.65	2.65	2.70
Hot rolled strip: Pittsburgh, Chicago, Gary, Cleveland, Middletown, Youngstown, Birmingham	2.10	2.10	2.10	2.15
Cold rolled strip: Pittsburgh, Cleveland, Youngstown	2.80	2.80	2.80	2.95
Sheets, galv., No. 24: Pittsburgh, Gary, Sparrows Point, Buffalo, Middletown, Youngstown, Birmingham.	3.50	3.50	3.50	3.50
Hot rolled sheets: Pittsburgh, Gary, Birmingham, Buffalo, Sparrows Point, Cleveland, Youngstown, Middletown.	2.10	2.10	2.10	2.15
Cold rolled sheets: Pittsburgh, Gary, Buffalo, Youngstown, Cleveland, Middletown	3.05	3.05	3.05	3.20
Wire nails: Pittsburgh, Chicago, Cleveland, Birmingham	2.55	2.55	2.55	2.45
Plain wire: Pittsburgh, Chicago, Cleveland, Birmingham	2.60	2.60	2.60	2.60
Tin plate, 100 lb. base box: Pittsburgh and Gary	$5.00	$5.00	$5.00	$5.00

On export business there are frequent variations from the above prices. Also in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables.

Pig Iron

Per Gross Ton:				
No. 2 fdy., Philadelphia	$24.84	$24.84	$24.84	$22.84
No. 2, Valley furnace	23.00	23.00	23.00	21.00
No. 2, Southern Cin'ti	23.06	23.06	23.06	21.06
No. 2, Birmingham	19.38	19.38	19.38	17.38
No. 2, foundry, Chicago†	23.00	23.00	23.00	21.00
Basic, del'd eastern Pa.	24.34	24.34	24.34	22.34
Basic, Valley furnace	22.50	22.50	22.50	20.50
Malleable, Chicago†	23.00	23.00	23.00	21.00
Malleable, Valley	23.00	23.00	23.00	21.00
L. S. charcoal, Chicago	30.34	30.34	30.34	28.34
Ferromanganese, seab'd carlots	100.00	100.00	100.00	80.00

†The switching charge for delivery to foundries in the Chicago district is 60c. per ton.

Scrap

Per Gross Ton:				
Heavy melting steel, P'gh	*$17.00*	$17.25	$17.75	$16.00
Heavy melting steel, Phila.	17.25	17.25	17.50	15.25
Heavy melting steel, Ch'go.	**16.875**	15.625	16.00	14.25
Carwheels, Chicago	17.25	17.25	16.50	13.00
Carwheels, Philadelphia	20.25	20.25	20.25	16.75
No. 1 cast, Pittsburgh	18.25	18.25	18.75	15.50
No. 1 cast, Philadelphia	20.25	20.25	20.25	16.75
No. 1 cast, Ch'go (net ton)	14.25	14.25	14.00	12.75

Coke, Connellsville

Per Net Ton at Oven:				
Furnace coke, prompt	$4.00	$4.00	$4.00	$3.75
Foundry coke, prompt	5.25	5.25	5.50	4.75

Non-Ferrous Metals

Cents per Lb. to Large Buyers:				
Copper, Electrolytic, Conn.	11.50	11.50	11.625	11.25
Copper, Lake, New York	11.50	11.50	11.625	11.375
Tin (Straits), New York	*47.50*	48.50	45.125	46.00
Zinc, East St. Louis	5.75	5.75	5.50	4.50
Zinc, New York	6.14	6.14	5.89	4.89
Lead, St. Louis	**5.25**	5.00	5.10	4.60
Lead, New York	**5.10**	4.85	5.25	4.75
Antimony (Asiatic), N. Y.	16.50	16.50	16.50	14.00

The Iron Age Composite Prices

	Finished Steel	Pig Iron	Steel Scrap
Mar. 5, 1940	2.261c. a Lb.	$22.61 a Gross Ton	$16.71 a Gross Ton
One week ago	2.261	22.61	16.71
One month ago	2.261	22.61	17.33
One year ago	2.286	20.61	15.08

Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strip. These products represent 85 per cent of the United States output.

Based on average for basic iron at Valley furnace and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

	Finished Steel High	Finished Steel Low	Pig Iron High	Pig Iron Low	Steel Scrap High	Steel Scrap Low
1940			$22.61, Jan. 2	$20.61, Feb. 20	$17.67, Jan. 2	$16.71, Feb. 20
1939	2.286c., Jan. 3	2.236c., May 16	$22.61, Sept. 19	$20.61, Sept. 12	22.50, Oct. 3	14.08, May 16
1938	2.512c., May 17	2.211c., Oct. 18	23.25, June 21	19.61, July 6	15.00, Nov. 22	11.00, June 7
1937	2.512c., Mar. 9	2.249c., Jan. 4	23.25, Mar. 9	20.25, Feb. 16	21.92, Mar. 30	12.92, Nov. 10
1936	2.249c., Dec. 28	2.016c., Mar. 10	19.73, Nov. 24	18.73, Aug. 11	17.75, Dec. 21	12.67, June 9
1935	2.062c., Oct. 1	2.056c., Jan. 8	18.84, Nov. 5	17.83, May 14	13.42, Dec. 10	10.33, Apr. 29
1934	2.118c., Apr. 24	1.945c., Jan. 2	17.90, May 1	16.90, Jan. 27	13.00, Mar. 13	9.50, Sept. 25
1933	1.953c., Oct. 3	1.792c., May 2	16.90, Dec. 5	13.56, Jan. 3	12.25, Aug. 8	6.75, Jan. 3
1932	1.915c., Sept. 6	1.870c., Mar. 15	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.43, July 5
1931	1.981c., Jan. 13	1.883c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.192c., Jan. 7	1.962c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.236c., May 28	2.192c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3

. . . THIS WEEK'S MARKET NEWS . . .

STEEL OPERATIONS

. . . Rate for industry declines point and a half to 63½%

STEEL operations continue to decline. This week's rate is estimated by THE IRON AGE at 63½ per cent, down to a point and a half from last week.

While there have been moderate gains in three districts — CHICAGO, which is up one point to 60 per cent, CLEVELAND-LORAIN, which is up three points to 71 per cent, and ST. LOUIS, which has gained a point and a half to 63 per cent—most of the other producing districts show a decline. YOUNGSTOWN, where the decline has been quite rapid, remains unchanged this week at 44 per cent.

The PITTSBURGH rate is down two points to 62 per cent, WHEELING-WEIRTON has dropped four points to 84 per cent, EASTERN PENNSYLVANIA is four points lower at 61 per cent, BUFFALO is five points lower at 56½ per cent, DETROIT has declined more than 13 points to 82½ per cent, and the BIRMINGHAM district is down to about 80 per cent after a long operation at high rates.

NEW BUSINESS

. . . Improvement in buying, noted a week ago, is still slight

WITH some slight indication of a quickening in demand, aggregate steel business at PITTSBURGH in the past week has changed but little from the level of the week before. Sentiment is definitely better, however, due, no doubt, to the placement of automobile tonnage and to an actual increase in export tonnages, the latter involving both semi-finished and finished steel products. There is some evidence that miscellaneous buyers are specifying a little more freely, which might indicate some consumers have stopped living off inventories.

A slight improvement in new business has been reported by all major sellers in the CHICAGO district. Though one office experienced an increase of more than 30 per cent over the previous week, sellers are reluctant to predict the begining of a definite upturn on the basis of such a brief experience. Sentiment is much more cheerful, however, and it is generally believed around CHICAGO that the leveling off period has been attained, especially since the CHICAGO operating rate gained a point this week for the first time this year.

In spite of the small improvement noticed recently in CHICAGO, it may be that unless new business increases substantially within the next week, operations will again drop. Only one mill there is operating well above its rate of incoming orders, and the backlog still remaining that permits this higher rate of operation will soon be worked down to nothing.

Improvements in the daily average of new steel business at CLEVELAND since Feb. 26 has given March an encouraging start, although too late to save February from being the lowest month in a long time. Noteworthy support has come from the automotive industry, which desires quick shipments. Machine tool producers and aircraft parts manufacturers are going full blast, resulting in fair buying of alloy and specialty steels. Munitions awards have brought small steel purchases and hold promises of larger orders.

Instead of extended deliveries on steel, buyers now find that intermittent rollings are a problem. Small orders are grouped by mills and held until the accumulation is sufficient to make a rolling worth while.

Steel mill equipment at CLEVELAND and YOUNGSTOWN is being overhauled after the strenuous fourth quarter and will be in shape to handle any influx of business that may develop. Capacity of certain blast furnaces is being enlarged, while in steel mills attempts are under way to eliminate a few of the bottlenecks which came to light during the fourth quarter.

New orders booked in the PHILADELPHIA district in the past week were just about equal to those of the preceding week. Over the past four weeks new business has been on a fairly level plane, equal to between 40 and 45 per cent of capacity. A district shipbuilder has allocated about 4000 tons of ship material among six mills. Published prices ruled on all this business. A small amount of additional Canadian ship tonnage has also been booked. Moderate tonnages of this Canadian business now been booked each week for the past three or four weeks and while individual orders are not large, the total of all such business looms substantial in comparison with domestic bookings. Export inquiry continues very active. In addition to Scandinavia, plate inquiry from South Africa and Italy is pending.

Few inquiries appeared on the PACIFIC COAST in the past week, but floods in the Sacramento Valley, which destroyed many highway bridges, are expected to lead to both structural and reinforcing steel projects in the comin months. Further substantial pipe projects requiring heavy plate tonnages are expected soon in the Los Angeles area.

About 4300 tons of carbon plates and 1100 tons of shapes and bars will he required for the two 10,000-ton light cruisers *Cleveland* and *Columbia* for whose construction the Navy Department on Tuesday made an award to the New York Shipbuilding Corp., Camden, N. J.

PIG IRON

. . . Indications of higher melt reported at some points

THE considerable volume of export inquiries, little of which is materializing into actual orders because of price differences, and signs of improvement in the melting rate in some areas are highlights of this week's pig iron market. While slackness in the domestic market has encouraged foreign buyers to press for lower prices, and difficulties in obtaining ship space are forecast, some sellers see possibilities of an early increase in shipments abroad.

Shipments in the PHILADELPHIA district are beginning to reflect the usual seasonal increase in melting operations, although current bookings continue to be in car lots for rounding out analyses. Severe weather in the East,

particularly in New England, has hampered business in the NEW YORK area and along the Eastern seaboard, where jobbing foundries continue to report a declining melting rate.

At CLEVELAND, aggregate February shipments fell 10 to 20 per cent below January, with principal support for new business still coming from machine tool foundries.

Meanwhile, cast iron pipe shops are supporting the melt in the SOUTH. Furnace interests report a fair volume of small orders in SOUTHERN OHIO where the melting rate is unchanged. Sales topped the preceding week at BOSTON and there are signs that a buying movement is not far off. Large foundries in New England have backlogs enabling them to continue at the current melting rate for a time.

ST. LOUIS shipments and sales were off considerably in February. Iron shipments last month in CHICAGO were considerably under January, but foundry coke movement was somewhat higher and the foundry melt is expected to gain in March.

PRICES

. . . Carnegie-Illinois announces unchanged second quarter quotations

CARNEGIE-ILLINOIS STEEL CORP.'s second quarter price announcement, dated March 6, reaffirms its present prices on hot and cold rolled carbon and alloy steel products, and states that these prices will apply on shipments to and including June 30, 1940, for delivery and consumption in the United States but that any shipments made after that date will be invoiced at the price in effect at the date of shipment.

WIRE PRODUCTS

. . . Spring demand is slow in getting started

TOTAL wire specifications including manufacturers' and merchant wire products were substantially unchanged in volume at PITTSBURGH from a week ago. Spring demand continues to be slow in getting started. In addition to the change in coated wire extras mentioned here last week, Pittsburgh Steel Co. has revised the base price on galvanized wire from 2.65c. to 2.60c. a lb., putting it on a par with the bright wire base and thus eliminating the chance for misinterpretation in the use of the base price. This adjustment has been more than compensated for by increases in galvanizing extras. For example, in gages 6 to 16, galvanized wire, the net increase in the extras amounts to $2 a ton. In the lighter gages, the increase in galvanized extras has been considerably more.

Sellers of manufacturers' wire at CLEVELAND report that there has been no real influx of new business recently, but shipments against old orders have been well maintained. The auto industry's pickup after a lull in buying has been encouraging. Another hopeful aspect is export inquiry. Backlogs have dwindled to the point where deliveries are good.

TUBULAR GOODS

. . . Market for oil country and merchant pipe is dull

Aggregate tubular sales at PITTSBURGH were in no greater volume than a week ago and the market for oil-country goods specifications, as well as standard pipe, remains relatively dull. A slight increase in boiler tube activity is noted and reflects a small pickup in locomotive orders.

REINFORCING BARS

. . . Awards total 9950 tons . . . Panama Canal tonnage to test prices

REINFORCING steel awards total 9950 tons, including 1225 tons for the Long Island Railroad grade crossing elimination at Rockaway, N. Y., and 1050 tons for the Grand Coulee Dam, Wash.

Reinforcing steel projects call for 3250 tons and include no inquiry of more than 700 tons.

Interest in the price situation will be centered on the outcome of the Panama Canal projects, one of which involves about 4000 tons. Prices continue spotty throughout the country, with the number of jobs bringing the full published price less numerous than a week ago. The volume of new projects continues small.

WAREHOUSE BUSINESS

. . . Volume done in February compared favorably with January

WAREHOUSE business at PITTSBURGH in February was down little if any from the January volume. Requirements reflected a widely diversified demand with bar orders outstanding. Local building projects of small character were responsible for fair activity in steel sheet piling. Prices were relatively firm, with the exception of concrete bar quotations, which are ranging anywhere from the full published price to $3 to $5 off, a condition which is parallel to that occurring in mill sales of concrete bars.

PITTSBURGH warehouse interests have advanced the base price on hot rolled and cold drawn alloy bars 25c. a 100 lb. in the 500 lb. to 999 lb. quantity bracket. No change was made in the 1000 lb. and over bracket. Effective last week is the requirement that if the combined weight of cold finished alloy bar items in an order is less than 300 lb., an extra of $1.75 a 100 lb. is added to the base price of the 300 lb. and under quantity bracket. The latter procedure applies to hot rolled alloy bar items.

February at CLEVELAND turned out better than most warehouses expected with fair daily volume of small orders. Although the month was not comparable to the fourth quarter average, it was above any one of the first eight months of 1939. Specialized warehouses and those handling such items as WD-4130-X chrome molybdenum steel have encountered good demand from plants doing armament and aircraft work.

Warehouse business for February in ST. LOUIS was reported to be about 10 per cent above January, and about 22 per cent ahead of February last year. One reason for the increase in February is that some orders that had been placed for shipment in January were held up until February on account of the severe cold weather the first month of the year.

BUFFALO warehousemen report activity during February just about the same as in January. Purchases have been general with emphasis on flat-rolled stock. Heavy lines were inactive.

After getting off to a slow start, February sales in PHILADELPHIA registered a rather sharp gain in the last two weeks of the month and the period's total sales, on a daily basis, were

slightly over the January average. The bulk of the increase was in the sales of specialty items. With the exception of weakness in galvanized sheets and reinforcing bars, quotations are following published lists closely.

Warehouse prices in DETROIT have remained unchanged since the first of the year and volume of business has followed a level course through January and February. However, an upturn, so far only minor in nature, has been noted in warehouse business in recent weeks. The beginning of the busy season in the tool and die industry has shifted the demand to tool steels and allied materials. This business is likely to become more important as the weeks pass because a heavy tool and die season is expected. Early inquiries and an early start on some automotive tooling programs has been accompanied by an influx of work from eastern aircraft concerns. Because of the volume and nature of work and the early start on some of it, a longer period of activity is expected and this should be reflected in better warehouse reports for the next few months.

SEMI-FINISHED STEEL

. . . Inquiry out for 16,000 tons of billets for shells

NON-INTEGRATED steel makers are specifying about as freely as a week ago but total semi-finished bookings have been swelled considerably in the past week by export tonnage. Producers look for additional raw steel requirements from abroad. Shipments, it is understood, are being hampered by lack of bottoms. An inquiry from a fabricator at Butler, Pa., involving about 16,000 tons of billets for shells was circulated recently. This inquiry, however, has probably been duplicated by other plants which might possibly share in the original shell inquiry put out by Britain. The trade is facing considerable difficulty in running down a great number of alleged inquiries which are floating around, for the simple reason that one large shell inquiry from abroad can easily and does result in a great number of steel inquiries emanating from companies capable of producing the order.

Some non-integrated steel producers have been taking delivery from CLEVELAND producers at a little better rate than might be expected under current conditions.

MERCHANT BARS

. . . Orders are holding at recent levels or improving

TOTAL hot rolled bar bookings at PITTSBURGH are holding at recent levels and, in the past 10 days or so have included a fairly good portion of export tonnage. Some support recently has been furnished by automotive releases. A considerable part of export business placed recently is for consignment to South America, although some items involving fair sized bar tonnages are reportedly for a European destination. A steel inquiry involving about 5000 tons of 3¾-in. shell rounds is in the market but the actual order for shells has not yet been placed. This inquiry, incidentally, accompanied the 16,000-ton billet inquiry mentioned elsewhere.

New orders in CHICAGO have increased slightly in the past two weeks. Current demand for bars is largely from farm equipment plants and manufacturers of automotive parts. Stocks held by the general manufacturing trade are believed to have been consumed to a great extent and the seasonal spring pick-up should result in an increasing demand on bar mills.

While February daily average new orders were 30 per cent ahead of January at CLEVELAND, the monthly volume was just about the same. Deliveries on most sizes are prompt. The cold drawn market is featured by machine tool orders and some for munitions.

RAILROAD BUYING

. . . Gulf, Mobile & Northern adds 200 cars to old inquiry

THE old inquiry for Gulf, Mobile & Northern Railroad, originally involving 1250 freight cars, which was mentioned in THE IRON AGE, issue of Jan. 11, has recently been expanded to include an additional 200 hopper cars. There is no indication as to when the 1000 box and 450 hopper cars will be placed. Pressed Steel Car Co., Pittsburgh, has booked 27 ore cars from Atchison, Topeka & Santa Fe Railroad. The project will require about 600 tons of steel.

The Santa Fe has ordered four high-speed diesel electric passenger locomotives of 2000 hp. each from the Electro-Motive Corp., LaGrange., Ill.

The Milwaukee will build 25 steel wood-lined cabooses at its shops in Milwaukee.

The General American Transportation Co. is building 500 refrigerator cars in its East Chicago, Ind., shops for its own use. The material for these cars has been purchased and a few are already in service.

The Milwaukee road has ordered 10 freight locomotives from the Baldwin Locomotive Works and 18 diesel switch engines, 12 from Electro Motive Corp., three from American Locomotive Co., two from Baldwin and one from General Electric Co.

SHEETS AND STRIP

. . . Moderate and spotty improvement noted in some areas

OWING to placement of orders from automotive centers, sheet bookings at PITTSBURGH have expanded moderately in the past week. Although fresh business from motor makers fell somewhat short of the volume covered in periodic buys late last year, recent purchases have been significant when compared with total sheet business. With several car makers having bought steel in the past 14 days and with the volume representing fair tonnages, steel producers feel that the flat rolled price structure has withstood substantial testing. Meanwhile, prices continue firm on major flat rolled products. Although hardly noticeable but nevertheless apparent has been the expansion in the volume of miscellaneous sheet specifications. This condition may portend a more substantial pickup in unclassified tonnage by the latter part of this month or early in April.

CLEVELAND reports that recent fair sized automotive buys, including tonnages for General Motors Corp. subsidiaries, are for reasonably quick delivery starting soon and covering the remaining weeks until the middle of April. This is described as an encouraging development.

Such improvement as has been reported recently in new business around CHICAGO is so slight that sellers are unwilling to forecast optimistically because of this fact alone. Should this trend continue for another few weeks, however, all would probably be convinced that a spring rise was underway. It is believed at CHICAGO that Ford may be in the market again soon.

Demand for sheets in the SOUTHERN OHIO area dipped a trifle under 50 per cent of mill capacity during the past week. Automotive demand is more encouraging but galvanized sheet demand is still low and disappointing. Mill interests generally feel that the

lack of interest in galvanized sheets is still a result of bad weather conditions and the desire of sheet users to liquidate inventories. Mill backlogs have dwindled but are still sufficient to maintain operations a few points above current sales.

STRUCTURAL STEEL

. . . Fabricated awards are largest since January, 1939

FABRICATED structural steel lettings of 36,100 tons are the highest since the first week in January, 1939. The largest awards are in the East and include 13,250 tons in Queens, N. Y., for an approach to the Midtown tunnel, New York; 9600 tons for a Long Island Railroad grade crossing elimination at Rockaway, N. Y., and 3000 tons for grade crossing elimination at Dunkirk, N. Y. Other sizable lettings are 1605 tons for bridges in Oklahoma; 1305 tons for the Dutch Kills bridge in Queens, N. Y., and 1050 tons for tunnel supports for Conchas Canal at Tucumcari, N. M.

Structural steel projects declined to 8010 tons from 12,600 tons last week. The only large inquiries reported are 1600 tons for a building for the Chesapeake & Potomac Telephone Co. in Baltimore, and 1500 tons for buildings for the Aluminum Co. of America in Vancouver, Wash.

The first important group of projects involved in New York State's grade crossing elimination program will be let on March 20 at Albany, N. Y. These projects involve about 2500 tons of structural steel and minor quantities of reinforcing material. Total cost of the seven projects is estimated at $1,300,000.

Sites have been announced for the construction of two housing projects in ST. LOUIS, to cost $7,682,400. One project is for negro families containing 580 units and one for white families containing 600 units, and to consist of three-story apartments and one- and two-story row houses, central heating plants and administration buildings.

A contract has been entered into for the financing of a toll bridge across the Mississippi River south of Jefferson Barracks, Mo., for St. Louis County. It is to be approximately 3640 ft. long and to cost about $3,500,000. Sverdrup & Parcel, Railway Exchange Building, St. Louis, are engineers.

The Bureau of Supplies and Accounts, Navy Department, has put out a supplementary inquiry for 307 tons of shapes and 53 tons of plates for delivery to nine yards. Bids will be opened on March 22.

BOLTS, NUTS AND RIVETS

. . . A fair volume of business is being done

THE change made in the list price of small rivets to provide extras for types of heads now considered special and for small quantity orders will be followed by CLEVELAND producers. The base price still remains at 65 and 10 on these small rivets but non-stock and special classifications have been created. Countersunk heads have been withdrawn from the standard list and put in the special classification.

Bolt, nut and rivet tonnage has been fair at CLEVELAND during the last 10 days.

. . . PLATES . . .

. . . Shipbuilder places orders for 4000 tons . . . More Canadian business

INCOMING plate tonnage at PITTSBURGH is no greater than a week ago and producers are hoping for a resumption in railroad buying. Plate consumers appear to have adopted a hand-to-mouth buying policy and to some extent are relying on inventories to maintain their own production schedules.

At CLEVELAND February volume was a trifle ahead of January. Most orders have been in small sizes recently. Bethlehem Steel Co. is low bidder on 800 tons of plate size pipe for the city of Toledo while two other parts of the project ,on which A. Bentley & Sons submitted the low bid, include around 250 tons of miscellaneous plate tonnage.

About 4000 tons of ship material has been distributed among six mills by a shipbuilder in the PHILADELPHIA area, with published prices ruling in all cases. Some additional Canadian ship tonnage has also been booked in the past two weeks. The unsettlement in export prices is keeping export bookings slow, but inquiries are gaining in volume. Domestic business, meanwhile, is very light, with little in the immediate picture to suggest any early reversal of this trend.

TIN PLATE

. . . Operations decline slightly to 54% as new buying lags

TIN plate operations this week are down one point to 54 per cent. The volume of sanitary packers' specifications has contracted in the past week or so but miscellaneous tin plate demand actually expanded slightly. Foreign business is by no means as large a share of total tonnages currently as was the case a few months ago. In some instances exchange difficulties have had considerable effect on fresh export business. Some tonnage consigned for export has been held up, pending the issuance of proper certificates by the Government of the country to which the material is to be shipped. Domestic tin plate demand is expected to continue its leveling off process in the near future. Meanwhile, producers have worked off unfilled tonnage to a substantial extent.

Weekly Bookings of Construction Steel

	Week Ended				Year to Date	
	Mar. 5, 1940	Feb. 27, 1940	Feb. 6, 1940	Mar. 7, 1939	1940	1939
Fabricated structural steel awards	36,100	9,850	28,900	18,325	173,410	171,275
Fabricated plate awards	170	5,055	1,575	1,970	29,160	30,225
Steel sheet piling awards	0	1,790	2,000	1,300	6,375	9,260
Reinforcing bar awards	9,950	2,900	13,100	14,900	73,320	97,795
Total Letting of Construction Steel..	46,220	19,595	45,575	36,495	282,265	308,555

FABRICATED STEEL

. . . Lettings in good volume at 36,100 tons . . . New projects decline to 8010 tons from 12,600 tons last week . . . Plate awards only 170 tons.

NORTH ATLANTIC STATES
AWARDS

13,250 Tons, Queens, N. Y., approach, Midtown tunnel, to Bethlehem Steel Co., Bethlehem, Pa.

9600 Tons, Rockaway, N. Y., grade crossing elimination, Long Island Railroad, to Bethlehem Steel Co., Bethlehem, Pa.

3000 Tons, Dunkirk, N. Y., grade crossing elimination, to Bethlehem Steel Co., Bethlehem, Pa., through C. B. Moon Co., Cleveland.

1350 Tons, Queens, N. Y., superstructure Dutch Kills bridge, to Harris Structural Steel Co., Plainfield, N. J.

400 Tons, Brooklyn, four crane bridges for Navy Department, to American Bridge Co., Pittsburgh.

340 Tons, Washington, Lincoln dial center for Chesapeake & Potomac Telephone Co., to Barber & Ross, Washington.

200 Tons, Malverne, N. Y., addition to high school, to Bethlehem Steel Co., Bethlehem, Pa.

180 Tons, Greenport, N. Y., oyster plant for Bluepoints Co., Inc., to Phoenix Bridge Co., Phoenixville, Pa.

125 Tons, Milford, Conn., Housatonic River bridge, to American Bridge Co., Pittsburgh.

SOUTH AND SOUTHWEST

1605 Tons, State of Oklahoma, bridges in McIntosh, Bryan, Pittsburgh and Custer Counties, to Capitol Steel & Iron Co., Oklahoma City.

1050 Tons, Tucumcari, N. M., tunnel supports for Conchas Canal (Specifications 880), to Colorado Fuel & Iron Corp., Denver, through Jahn-Bressi-Bevanda Constructors, Inc., Los Angeles.

510 Tons, State of Oklahoma, bridges in Harper and Osage Counties, to J. B. Klein Iron & Foundry Co., Oklahoma City.

315 Tons, Quay County, Okla., bridge, to Missouri Valley Bridge & Iron Co., Leavenworth, Kan.

300 Tons, Crutchfield, N. C., bridge project, to Virginia Bridge Co., Roanoke, Va.

290 Tons, Mayes County, Okla., bridge, to Tulsa Boiler & Machinery Co., Tulsa, Okla.

CENTRAL STATES

770 Tons, Flint, Mich., A.C. Spark Plug factory building, to Indiana Bridge Co., Muncie, Ind.

180 Tons, Chicago, alterations to Northwest power plant, Commonwealth Edison Co., to Joseph T. Ryerson & Son, Inc., Chicago, through Herlihy Mid-Continent Co., Chicago.

150 Tons, Cleveland, Pepsi Cola Bottling Co. plant, to American Bridge Co., Pittsburgh, through Albert M. Higley Co., Cleveland.

140 Tons, Chicago, section of upper dock for Armour & Co., to Duffin Iron Co., Chicago.

135 Tons, Frazier, Ohio, State highway project, to Fort Pitt Bridge Works Co., Massillon.

120 Tons, Apple, Ill., Illinois Central bridge, to Joseph T. Ryerson & Son, Inc., Chicago.

WESTERN STATES

625 Tons, Bonneville, Ore., trash racks, etc., for U. S. Engineers Office; 465 tons to Bethlehem Steel Co., Bethlehem, Pa.; 160 tons to Pacific Car & Foundry Co., Seattle.

550 Tons, Bonneville, Ore., substations for power house, to Lehigh Structural Steel Co., Allentown, Pa.

350 Tons, Sunnyvale, Cal., aeronautics laboratory and hangar at Moffett Field, to Bethlehem Steel Co., San Francisco, through James I. Barnes, Santa Monica, Cal., contractor.

220 Tons, Denver, store addition for W. T. Grant Co., to Midwest Steel & Iron Works, Denver.

140 Tons, Chino, Cal., prison, to Pacific Iron & Steel Co., Los Angeles.

HAWAII

170 Tons, Oahu, T. H., Navy ammunition magazines, to Bethlehem Steel Co., San Francisco, through Fred J. Early, San Francisco, contractor.

PENDING STRUCTURAL PROJECTS

NORTH ATLANTIC STATES

1600 Tons, Baltimore, building, Chesapeake & Potomac Telephone Co.

988 Tons, Rochester, N. Y., grade crossing elimination, project P.S.C. 6600.

650 Tons, Willowbrook, Staten Island, N. Y., nurses' home; bids March 27.

325 Tons, Alden, N. Y., grade crossing elimination; bids close March 20.

250 Tons, South Boston, storage building for New England Greyhound Lines.

220 Tons, Brooklyn, building for South Brooklyn Savings Bank.

150 Tons, Brooklyn, alterations, Third Avenue station, for Brooklyn Edison Co.

135 Tons, Patchogue, N. Y., railroad crossing elimination, project P.S.C. 5372.

120 Tons, New York, curbing, contract 12-B.

110 Tons, Highland Falls, N. Y., bridge repairs for New York Central Railroad.

105 Tons, Ballston Spa, N. Y., railroad crossing elimination, project W.P.G.S., R.C. 40-8.

105 Tons, Erie County, N. Y., grade crossing elimination, project P.S.C. 5386.

100 Tons, Richburg, N. Y., grade crossing elimination; bids close March 20.

Unstated tonnage, Bellville, Long Island, administration building; bids March 10.

CENTRAL STATES

350 Tons, Cleveland, building extensions, for Aluminum Co. of America.

330 Tons, Springfield, Ohio, store for F. W. Woolworth Co.

300 Tons, Painesville, Ohio, Industrial Rayon factory addition.

150 Tons, Toledo, high service pumping station for city; A. Bentley & Sons, low bidder.

150 Tons, Akron, Ohio, Elizabeth Park housing project; bids March 8.

150 Tons, Detroit, garage, for Coca-Cola Bottling Co.

150 Tons, Chicago, plant addition for Rheam Mfg. Co.

125 Tons, Toledo, low service pumping station for city; A. Bentley & Sons, low bidder.

110 Tons, Canton, Ohio, storeroom, for Timken Steel & Tube Co.

110 Tons, Rantoul, Ill., hangar annexes; bids March 12.

WESTERN STATES

1500 Tons, Vancouver, Wash., buildings for Aluminum Co. of America.

FABRICATED PLATES

AWARDS

170 Tons, Long Island City, N. Y., Pepsi Cola Co., tank, to Chicago Bridge & Iron Co., Chicago.

PENDING PROJECTS

800 Tons, Toledo, 42-in. pipe for city; Bethlehem Steel Co., Bethlehem, Pa., low bidder.

500 Tons, Reno, Nev., 24-in. pipe for Sierra Light & Power Co.

SHEET PILING

PENDING PROJECTS

800 Tons, Cleveland, contract No. 25, Cuyahoga River improvement; bids March 7.

SWOC Collectors Leave, McKeesport Plant Reopens

PITTSBURGH — McKeesport Tin Plate Corp. resumed operations early this week following a week's shut-down which began when SWOC dues collectors turned back several hundred employees who failed to show paid-up dues cards. The company, which has a SWOC contract, had insisted that the plant would not be reopened until proper protection was afforded employees by civic officials. Although international headquarters of SWOC had termed the affair a "local one" the tin plate plant reopened after a conference between company officials, Philip Murray, SWOC chairman, and other union officers. No dues pickets were on hand when the mill started.

Late Personals

LOUIS C. EDGAR has been appointed assistant chief engineer, Carnegie-Illinois Steel Corp., Pittsburgh, and is succeeded by ARTHUR V. WIEBEL as chief engineer of the corporation's Pittsburgh district. Mr. Edgar has been chief engineer of the Pittsburgh district since 1936 and has been with subsidiaries of United States Steel Corp. for 35 years. He previously was chief works engineer of the company's Edgar Thomson works. Mr. Wiebel has been with the company since 1933, when he was an engineering estimator at the Youngstown works. In 1937 he worked at the Pittsburgh general engineering offices of Carnegie-Illinois and since 1938 has been assistant chief engineer of the Homestead, Pa., works.

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JOHN L. SULLIVAN has been appointed general superintendent of H. C. Frick Coke Co., with headquarters at Uniontown, Pa., succeeding the late W. C. Hood. Mr. Sullivan has been associated with subsidiaries of United States Steel Corp. for more than 25 years, having first been employed as shipping clerk by U. S. Coal & Coke Co., Gary, W. Va., in 1914. He later was made assistant general superintendent of the West Virginia division, and assistant general superintendent of the Kentucky division. He has been assistant general superintendent of the company since Aug. 1, 1939.

. . . NON-FERROUS . . .

. . . France buys 75,000 tons of copper . . . Heavy buying pushes lead prices up ¼c. . . . Week's spelter sales total 14,522 tons.

NEW YORK, March 5—The outstanding feature of the market in the past week was the purchase of 75,000 tons of copper by France at a price reported to be 11.50c. per lb., f.a.s. Delivery of this tonnage is to be spread over June, July and August, and probably all the metal will be from mines outside this country, although a large part of the smelting of the ores may be done domestically. This latest buy brings France's purchases in the past month to 100,000 tons. Since the war started it is estimated that France has purchased about 300,000 tons. Domestic buying during the past week was, as had been expected after the buying wave of 10 days ago, very light, with producers' quotations holding firmly to 11.50c. per lb., New York. Despite the current dullness, producers' sales in February were close to 150,000 tons, the sixth highest monthly total of record. The outside market was likewise very dull all week, with resale prices today hovering in the neighborhood of 11.70c. to 11.75c. per lb., Connecticut Valley. Export price today was nominally 11.65c. per lb., f.a.s., for March shipment.

Lead

A heavy consumer demand for lead, extending over the week-end of the 24th, which was far in excess of daily quotas, pushed the price of lead up ¼c. to a basis of 5.25c. per lb. on Wednesday. A fairly good demand continued after the price advance, with chief call being for April positions, although a surprisingly good volume of March demands were encountered. By the end of the week April was estimated to be between 35 and 40 per cent covered and March around 85 per cent bought.

Zinc

Prime Western sales in the past week were 14,500 tons, compared with 7830 tons in the preceding period. Sales of the common grades in the week were 4692 tons compared with 3818 tons in the previous week. Buying dwindled sharply over the week-end and the first two days of the present week found only small lot buyers in the market. Although most consumers are fairly well covered on nearby needs, the approach of the spring season and its accompanying spurt in the output of galvanized products is keeping the market fairly buoyant. Quotations are firm and unchanged at 6.14c. per lb., New York.

Tin

The decline in the sterling rate pushed values down toward the end of the past week, but the possibility that the British government might force importers to obtain sterling exchange at the official rate instead of in the open market caused a slight upswing in prices yesterday and today. Should this new move eventuate, it would mean an increase of about 1.75c. per lb., at New York, under present conditions. The threat of higher levels brought out a fair amount of consuming buying on Monday and today. Prompt Straits today is quoted at 47.50c. per lb., New York. If the decline in sterling could be discounted, today's price would be about 48c., but if importers were buying sterling at the official rate it would be about 49.25c. Cash standards in London this morning were £254 5s.

February Average Prices

The average prices of the major nonferrous metals in February, based on quotations appearing in THE IRON AGE, were as follows:

	Per Lb.
Electrolytic copper, Conn. Valley	11.40c.
Lake copper, Eastern delivery	11.41c.
Straits tin, spot, New York	45.85c.
Zinc, East St. Louis	5.53c.
Zinc, New York	5.92c.
Lead, St. Louis	4.92c.
Lead, New York	5.07c.

NON-FERROUS PRICES

Cents per lb. for early delivery

	Feb. 28	Feb. 29	Mar. 1	Mar. 2	Mar. 4	Mar. 5
Copper, Electrolytic[1]	11.50	11.50	11.50	11.50	11.50	11.50
Copper, Lake	11.50	11.50	11.50	11.50	11.50	11.50
Tin, Straits, New York	47.70	47.75	47.50	....	47.25	47.50
Zinc, East St. Louis[2]	5.75	5.75	5.75	5.75	5.75	5.75
Lead, St. Louis[3]	5.10	5.10	5.10	5.10	5.10	5.10

[1] Delivered Conn. Valley. Deduct ¼c. for New York delivery. [2] Add 0.39c. for New York delivery. [3] Add 0.15c. for New York delivery.

Warehouse Prices

Cents per lb., Delivered

	New York	Cleveland
Tin, Straits, pig	48.75c.	51.25c.
Copper, Lake	13.25c.	12.625c.
Copper, electro	12.75c.	12.625c.
Copper, castings	12.375c.	12.375c.
*Copper sheets, hot-rolled	20.12c.	20.12c.
*Yellow brass sheets	18.31c.	18.31c.
*Seamless brass tubes	21.06c.	21.06c.
*Seamless copper tubes	20.62c.	20.62c.
*Yellow brass rods	14.26c.	14.26c.
Zinc slabs	7.10c.	7.75c.
Zinc sheets, No. 9 casks	12.00c.	13.35c.
Lead, American pig	6.25c.	5.75c.
Lead, bar	8.20c.	8.50c.
Lead, sheets, cut	8.50c.	8.50c.
Antimony, Asiatic	16.00c.	17.00c.
Alum., virgin, 99 per cent plus	21.50c.	22.50c.
Alum., No. 1 remelt., 98 to 99 per cent	19.00c.	19.50c.
Solder, ½ and ½	30.25c.	30.00c.
Babbitt metal, anti-friction grade	27.75c.	20.25c.

*These prices, which are also for delivery from Chicago warehouses, are quoted with the following percentages allowed off for extras: on copper sheets, 33⅓; on brass sheets and rods, 40; on brass tubes, 33⅓, and copper tubes, 40.

Old Metals

Cents per lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators. Selling prices are those charged to consumers after the metal has been prepared for their uses.

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	9.50c.	10.125c.
Copper, hvy. and wire	8.50c.	8.875c.
Copper, light and bottoms	7.50c.	8.00c.
Brass, heavy	5.00c.	5.50c.
Brass, light	4.125c.	4.875c.
Heavy machine composition	8.00c.	8.625c.
No. 1 yel. brass turnings	4.75c.	5.75c.
No. 1 red brass or compos. turnings	7.50c.	8.00c.
Lead, heavy	4.00c.	7.375c.
Cast aluminum	8.00c.	9.00c.
Sheet aluminum	14.00c.	15.00c.
Zinc	2.75c.	4.00c.

Miscellaneous Non-Ferrous Prices

ALUMINUM, delivered: virgin, 99 per cent plus, 20c.-21c. a lb.; No. 12 remelt No. 2 standard, 19c.-19.50c. a lb. NICKEL, electrolytic, 35c.-36c. a lb. base refinery, lots of 2 tons or more. ANTIMONY, prompt: Asiatic, 16.50c. a lb., New York; American, 13c. a lb., f.o.b. smelter. QUICKSILVER, nominally, $183 per flask of 76 lb. BRASS INGOTS, commercial 85-5-5-5, 12c. a lb.

IRON AND STEEL SCRAP

. . . Markets quiet . . . Counteracting trends leave composite unchanged for second week.

MARCH 5—Most markets have been extremely dull during the past week, and, with one exception, there have been no substantial mill sales made. Small sales at Pittsburgh have justified a decline of 25c. in the quotation for No. 1 heavy melting steel there, but this softness has been offset by an advance of a like amount at Chicago, based solely on broker-dealer transactions, however. The Philadelphia market is on firmer ground with the confirmation of a mill sale of 25,000 tons at the top end of the current quoted range, representing the leading transaction of the week. As a result, the composite price of No. 1 steel remains at $16.71, making the third week that this figure has been quoted and indicating that the bottom of the price decline may have been reached. There has been no upward movement in the market since the end of last October when a feeble rally took place.

Short covering has forced St. Louis buying prices up 25c. In most other districts, however, prices are unchanged in the absence of any significant activity. The February average of THE IRON AGE scrap composite price was $16.875.

Pittsburgh

Although the market has been relatively quiet the past week, some small tonnages of No. 1 heavy melting have been sold into consumption at $16.75. Other consuming points in the district, however, have paid as much as $17.25 for No. 1 heavy melting steel within the past week. No. 1 steel therefore becomes quotable this week at $16.75 to $17.25, down 25c. from last week's level. While not necessarily significant, this decline in price adequately reflects the nominal character of the market due to lack of strong demand.

Chicago

This market is 25c. a ton higher this week on the basis of higher broker-dealer transactions. Brokers are paying $15.75 generally for heavy melting steel as against $15.50 a week ago. The movement of old material is rather sluggish. No railroad lists of importance are pending. A large mill which has been out of the market for a month is expected to buy some time this week but at this writing nothing had been done.

Philadelphia

Substantiation of the current opinion that the market is scraping bottom was seen in the recent purchase of 25,000 tons of scrap by a district mill at $17.50 for No. 1 steel and $16.50 for No. 2. There were also several other moderate purchases of No. 1 steel made during the week at both $17 and $17.50. A small tonnage of No. 2 material was bought from a nearby yard at $15.50 and some heavy breakable cast was sold at $18.50. The latter sale represents an increase of 50c. over the preceding sale. A small lot of turnings were acquired at $10 in the past week, but brokers have in many cases been forced to pay this price in covering old orders. The March letting of Budd bundles, 4000 tons, went at about $16, f.o.b., equal to about $17.50, delivered Coatesville. This price was the same as that paid for the interim lot of 1500 tons sold on Feb. 19.

Youngstown

So far as can be learned, there hasn't been any mill buying here. The market appears to be awaiting a change either way and all prices are nominal. The weather has been unfavorable for outside wrecking projects and scrap gathering, but at the same time this has helped hold the price structure up.

Cleveland

The market continues to drag along here and has managed to maintain its status quo through lack of activity. There are no indications as to what the principal local railroad list might bring this week, or how much steel will be sold. Indeed, interest seemed at low ebb at the start of this week. Printed quotations are nominal.

Buffalo

An absence of significant sales leaves the market unchanged here this week. Further operating reductions on the part of the mills as yet have had no depressing effect on scrap values. Cast grades are moving in small lots at quoted prices.

St. Louis

Dealers have raised their buying prices 25c. a ton this week on steel making grades in order to bring scrap iron into the market to cover their short interest, which is large. Mills are not buying because of ample stocks and recent heavy commitments. Railroad lists: Missouri Pacific, 1100 tons; New York, Chicago & St. Louis, 640 tons; Chicago, Milwaukee, St. Paul & Pacific, 250 tons.

Cincinnati

The feeling of the district scrap dealers that the bottom has been reached in price recession brought a more optimistic undertone to the market during the past week. Business, however, is all but at a standstill. Some small trading to fill out yard supplies and to apply on continuing contracts, constituted the sole business during the week. Mills are not interested in further material and appear to be liquidating inventories.

Birmingham

The scrap market is unchanged here, with indications pointing to a stagnant situation for the present. Although weather conditions are better, stocks have not been transported to local yards in impressive volume, and prices and activities remain unchanged and unaffected. The drop in open-hearth operations at Gadsden and Ensley may cause a further setback.

New York

Not much material is being offered at present prices, which are unchanged both for domestic shipment and for export, with the exception of rerolling rails, which are weaker. A great deal of uncertainty still beclouds the vessel situation, particularly as regards shipments to Great Britain. Loadings for Italy are much more regular. Japanese business is about cleaned up here, the last two orders having gone to the West Coast, and no new buying is expected for some months.

Boston

The scrap market is very largely an export affair. England is providing boats for loading more freely. A boat left here March 3 with 4500 tons for Europe; one exporter is loading here and has four other boats waiting for cargoes; a boat is expected to start loading this week at a private dock in Providence and another at the public dock. Export prices remain unchanged at $15 a ton delivered dock for No. 1 steel with an occasional sale at $15.50, but new purchases are few. However, with the movement of material to seaboard much more free than heretofore, exporters may be forced to make purchases before long. The market for domestic consumption is listless with prices firm and unchanged.

Toronto

Quotations are firm and new business is appearing in better volume. Steel mills and other consumers are taking better tonnages of heavy melting steel and low phos. steel, while electric furnace operators have been in the market steadily for the past two or three weeks for turnings, bushelings and borings. Foundries and radiator makers have been providing better demand for cast scrap and stove plate and some have placed contracts covering delivery of the next couple of months. Local yards are well stocked for all current needs.

Detroit

Automotive lists which closed during the last week of February brought prices a shade under late January lists and in line with current quotations. Buying was reported to be spotty in its nature, with occasional small tonnages bringing relatively high prices but with the larger tonnages moving at lower prices, compared with January. Reduction in the Detroit ingot production rate to 82½ per cent cast considerable gloom over scrap dealers in this area and possibility that prices might sag further arose after the decrease in open-hearth operations became known.

Iron and Steel Scrap Prices

PITTSBURGH

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	$16.75 to	$17.25
Railroad heavy melting	18.00 to	18.50
No. 2 heavy melting...	15.25 to	15.75
Railroad scrap rails....	18.00 to	18.50
Rails 3 ft. and under...	20.50 to	21.00
Comp. sheet steel	16.75 to	17.25
Hand bundled sheets..	15.75 to	16.25
Heavy steel axle turn.	14.75 to	15.25
Machine shop turnings	10.50 to	11.00
Short. shov. turnings..	12.00 to	12.50
Mixed bor. & turn.....	8.00 to	8.50
Cast iron borings	8.00 to	8.50
Cast iron carwheels ..	18.50 to	19.00
Heavy breakable cast.	15.00 to	15.50
No. 1 cupola cast	18.00 to	18.50
RR. knuckles & coup..	20.50 to	21.00
Rail coil springs.....	20.50 to	21.00
Rail leaf springs.....	20.50 to	21.00
Rolled steel wheels ...	20.50 to	21.00
Low phos. billet crops.	21.00 to	21.50
Low phos. punchings..	21.00 to	21.50
Low phos. heavy plate.	19.50 to	20.00
Railroad malleable	21.00 to	21.50

PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	$17.00 to	$17.50
No. 2 hvy. mltng. steel.	16.00 to	16.50
Hydraulic bund., new.	17.00 to	17.50
Hydraulic bund., old..	14.00 to	14.50
Steel rails for rolling..	20.50 to	21.00
Cast iron carwheels...	20.00 to	20.50
Hvy. breakable cast...	....	18.50
No. 1 cupola cast	20.00 to	20.50
Mixed yard (f'd'y) scrap	16.00 to	16.50
Stove plate (steel wks.)	....	15.00
Railroad malleable ...	21.00 to	22.00
Machine shop turn....	10.00 to	10.50
No. 1 blast furnace..	.....	10.00
Cast borings	10.50 to	11.00
Heavy axle turnings...	15.00 to	15.50
No. 1 low phos. hvy...	21.00 to	21.50
Couplers & knuckles ..	21.00 to	21.50
Rolled steel wheels ...	21.00 to	21.50
Steel axles	21.50 to	22.00
Shafting	22.00 to	22.50
Spec. iron & steel pipe	16.00 to	16.50
Cast borings (chem.)..	14.00 to	14.50

CHICAGO

Delivered to Chicago district consumers:

	Per Gross Ton	
Hvy. mltng. steel	$15.75 to	$16.00
Auto. hvy. mltng. steel alloy free	14.75 to	15.00
No. 2 auto steel	12.75 to	13.25
Shoveling steel	15.75 to	16.00
Factory bundles	15.25 to	15.50
Dealers' bundles	13.75 to	14.00
No. 1 busheling	14.75 to	15.00
No. 2 busheling, old...	5.75 to	6.25
Rolled carwheels	18.00 to	18.50
Railroad tires, cut	18.25 to	18.75
Railroad leaf springs..	17.75 to	18.25
Steel coup. & knuckles.	17.75 to	18.25
Axle turnings	14.50 to	15.00
Coil springs	18.75 to	19.25
Axle turn. (elec.)	16.25 to	16.75
Low phos. punchings..	18.00 to	18.50
Low phos. plates 12 in. and under	17.50 to	18.00
Cast iron borings	9.00 to	9.50
Short shov. turn.	9.50 to	10.00
Machine shop turn....	8.75 to	9.25
Rerolling rails	18.25 to	18.75
Steel rails under 3 ft..	17.50 to	18.00
Steel rails under 2 ft..	18.50 to	19.00
Angle bars, steel	17.75 to	18.25
Cast iron carwheels ...	17.00 to	17.50
Railroad malleable	18.25 to	18.75
Agric. malleable	14.25 to	14.75
	Per Net Ton	
Iron car axles	21.50 to	22.00
Steel car axles	20.25 to	20.75
Locomotive tires	14.25 to	14.75
Pipes and flues	10.75 to	11.25
No. 1 machinery cast..	13.50 to	14.00
Clean auto. cast	13.75 to	14.25
No. 1 railroad cast....	13.25 to	13.75
No. 1 agric. cast.....	12.00 to	12.50
Stove plate	8.75 to	9.25
Grate bars	9.50 to	10.00
Brake shoes	10.50 to	11.00

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	$17.00 to	$17.50
No. 2 hvy. mltng. steel.	16.00 to	16.50
Low phos. plate	20.00 to	20.50
No. 1 busheling	16.25 to	16.75
Hydraulic bundles	16.50 to	17.00
Machine shop turn....	11.00 to	11.50

CLEVELAND

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	$16.00 to	$16.50
No. 2 hvy. mltng. steel.	15.00 to	15.50
Comp. sheet steel	15.50 to	16.00
Light bund. stampings	13.00 to	13.50
Drop forge flashings...	14.00 to	14.50
Machine shop turn.....	9.00 to	9.50
Short shov. turn.	10.00 to	10.50
No. 1 busheling	14.75 to	15.25
Steel axle turnings....	14.50 to	15.00
Low phos. billet and bloom crops	21.50 to	22.00
Cast iron borings	10.00 to	10.50
Mixed bor. & turn.....	10.00 to	10.50
No. 2 busheling	10.00 to	10.50
No. 1 cupola cast.	17.00 to	17.50
Railroad grate bars...	13.50 to	14.00
Stove plate	13.50 to	14.00
Rails under 3 ft.	21.00 to	21.50
Rails for rolling	20.00 to	20.50
Railroad malleable	19.50 to	20.00

BUFFALO

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	$16.00 to	$16.50
No. 2 hvy. mltng. steel.	14.50 to	15.00
Scrap rails	17.00 to	17.50
New hvy. b'ndled sheets	14.00 to	14.50
Old hydraul. bundles..	12.50 to	13.00
Drop forge flashings...	14.00 to	14.50
No. 1 busheling	14.00 to	14.50
Machine shop turn....	9.50 to	10.00
Shov. turnings	12.50 to	13.00
Mixed bor. & turn.....	10.50 to	11.00
Cast iron borings	10.50 to	11.00
Knuckles & couplers..	20.00 to	21.00
Coil & leaf springs....	20.00 to	21.00
Rolled steel wheels ...	20.00 to	21.00
No. 1 machinery cast..	17.50 to	18.00
No. 1 cupola cast.....	16.50 to	17.00
Stove plate	14.50 to	15.00
Steel rails under 3 ft...	21.50 to	22.00
Cast iron carwheels...	17.50 to	18.00
Railroad malleable ...	19.00 to	19.50

ST. LOUIS

Dealers' buying prices per gross ton delivered to consumer:

Selected hvy. melting.	$14.50 to	$15.00
No. 1 hvy. melting.....	14.00 to	14.50
No. 2 hvy. melting.....	13.50 to	14.00
No. 1 locomotive tires.	15.75 to	16.25
Misc. stand. sec. rails.	15.25 to	15.75
Railroad springs	16.25 to	16.75
Bundled sheets	8.50 to	9.00
No. 1 busheling	13.00 to	13.50
Cast bor. & turn.....	5.50 to	6.00
Machine shop turn....	6.00 to	6.50
Heavy turnings	10.00 to	10.50
Rails for rolling	17.50 to	18.00
Steel car axles	18.00 to	18.50
No. 1 RR wrought....	10.25 to	10.75
No. 2 RR wrought....	13.25 to	13.75
Steel rails under 3 ft..	18.00 to	18.50
Steel angle bars	14.50 to	15.00
Cast iron carwheels...	16.00 to	16.50
No. 1 machinery cast..	17.00 to	17.50
Railroad malleable	15.75 to	16.25
Breakable cast	13.75 to	14.25
Stove plate	10.50 to	11.00
Grate bars	10.00 to	10.50
Brake shoes	10.50 to	11.00

CINCINNATI

Dealers' buying prices per gross ton at yards:

No. 1 hvy. mltng. steel.	$12.50 to	$13.00
No. 2 hvy. mltng. steel.	10.50 to	11.00
Scrap rails for mltng..	17.00 to	17.50
Loose sheet clippings.	8.00 to	8.50
Hydrau. b'ndled sheets	12.00 to	12.50
Cast iron borings	3.75 to	4.25
Machine shop turn....	5.00 to	5.25
No. 1 busheling	9.00 to	9.50
No. 2 busheling	3.00 to	3.25
Rails for rolling	18.50 to	19.00
No. 1 locomotive tires.	14.00 to	14.50
Short rails	19.00 to	19.50
Cast iron carwheels...	14.50 to	15.00
No. 1 machinery cast..	16.00 to	16.50
No. 1 railroad cast....	14.00 to	14.50
Burnt cast	7.75 to	8.25
Stove plate	7.75 to	8.25
Agricul. malleable	12.50 to	13.00
Railroad malleable	15.50 to	16.00
Mixed hvy. cast.	13.50 to	14.00

BIRMINGHAM

Per gross ton delivered to consumer:

No. 1 hvy. melting steel	....	$15.00
No. 2 hvy. melting steel	....	14.00
No. 1 busheling	....	13.00
Scrap steel rails	....	15.00
Steel rails under 3 ft...	....	16.00
Rails for rolling	....	16.50
Long turnings	....	5.00
Cast iron borings	....	7.50
Stove plate	....	11.00
Steel axles	....	20.00
No. 1 RR wrought.....	....	14.00
No. 1 cast	....	15.00
No. 2 cast	....	11.00
Cast iron carwheels ..	....	13.00
Steel car wheels	....	16.00

DETROIT

Dealers' buying prices per gross ton:

No. 1 hvy. mltng. industrial steel	12.50 to	13.00
No. 2 hvy. mltng. steel.	11.50 to	12.00
Borings and turnings.	6.50 to	7.00
Long turnings	6.00 to	6.50
Short shov. turnings..	8.00 to	8.50
No. 1 machinery cast..	13.50 to	14.00
Automotive cast	15.00 to	15.50
Hvy. breakable cast...	10.50 to	11.00
Stove plate	8.50 to	9.00
Hydraul. comp. sheets.	13.25 to	13.75
New factory bushel....	12.00 to	12.50
Sheet clippings	8.25 to	9.25
Flashings	11.75 to	12.25
Low phos. plate scrap.	13.50 to	14.00

NEW YORK

Dealers' buying prices per gross ton on cars:

No. 1 hvy. mltng. steel.	$13.00 to	$13.50
No. 2 hvy. mltng. steel.	11.50 to	12.00
Hvy. breakable cast....	....	14.00
No. 1 machinery cast.	16.00 to	16.50
No. 2 cast	12.50 to	13.00
Stove plate	10.50 to	11.00
Steel car axles	19.00 to	20.00
Shafting	19.00 to	20.00
No. 1 RR. wrought....	14.00 to	15.00
No. 1 wrought long....	12.50 to	13.00
Spec. iron & steel pipe	13.50 to	14.00
Rails for rolling	15.50 to	16.00
Clean steel turnings*..	6.00 to	6.25
Cast borings*	6.00 to	6.25
No. 1 blast furnace....	6.00 to	6.25
Cast borings (chem.)..		Nominal
Unprepared yard scrap	7.00 to	7.50
Light iron	5.00 to	5.50

Per gross ton, delivererd local foundries:

No. 1 machin. cast.....	$17.00 to	$18.50
No. 2 cast	16.50 to	17.00

* $1.50 less for truck loads.

BOSTON

Dealers' buying prices per gross ton

Breakable cast	....	$12.65
Machine shop turn. ...	....	5.15
Mixed bor. & turn.....	$4.50 to	4.75
Bun. skeleton long	....	8.75
Shafting	17.00 to	17.25
Stove plate	9.75 to	10.00
Cast bor. chemical	8.00 to	8.50

Per gross ton delivered consumers' yards:

Textile cast	$17.00 to	$19.00
No. 1 machine cast....	17.00 to	19.00

Per gross ton delivered dealers' yards:

No. 1 hvy. mltng. steel.	....	$13.00
No. 2 steel	....	12.00

PACIFIC COAST

Dealers' buying prices per gross ton on cars:

No. 1 hvy. mltng. steel.	$10.50 to	$12.50
No. 2 hvy. mltng. steel.	9.50 to	11.50

CANADA

Dealers' buying prices at these yards, per gross ton:

	Toronto	Montreal
Low phos. steel.....	$11.50	$11.00
No. 1 hvy. mltng. steel.	11.00	10.50
No. 2 hvy. mltng. steel.	9.75	9.25
Mixed dealers steel...	8.75	8.25
Drop forge flashings...	9.75	9.25
New loose clippings...	8.75	8.25
Busheling	6.00	5.50
Scrap pipe	7.75	7.25
Steel turnings	7.00	6.50
Cast borings	6.50	6.00
Machinery cast	17.00 to	16.50
Dealers' cast	16.00 to	15.50
Stove plate	12.00 to	11.50

EXPORT

Dealers' buying prices per gross ton:

New York, truck lots, delivered, barges		
No. 1 hvy. mltng. steel.	....	$14.00
No. 2 hvy. mltng. steel.	....	11.50
No. 2 cast	12.00 to	12.50
Stove plate	10.00 to	10.50
Boston on cars at Army Base or Mystic Wharf		
No. 1 hvy. mltng. steel.	$15.00 to	$15.50
No. 2 hvy. mltng. steel.	....	14.00
Rail (scrap)	$15.00 to	$15.50
Stove plate	8.00 to	8.50
Philadelphia, delivered alongside boats, Port Richmond.		
No. 1 hvy. mltng. steel.	$16.50 to	$17.00
No. 2 hvy. mltng. steel.	15.25 to	15.50

PRICES ON FINISHED AND SEMI-FINISHED IRON AND STEEL

Steel prices on these pages are base prices only and f.o.b. mill unless otherwise indicated. On some products either quantity deductions or quantity extras apply. In many cases gage, width, cutting, physical, chemical extras, etc., apply to the base price. Actual realized prices to the mill, therefore, are effected by extras, deductions, and in most cases the amount of freight which must be absorbed in order to meet competition

SEMI-FINISHED STEEL

Billets, Blooms and Slabs

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (Rerolling only). Prices delivered Detroit are $2 higher. F.o.b. Duluth, billets only, $2 higher.

	Per Gross Ton
Rerolling	$34.00
Forging quality	40.00

Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

	Per Gross Ton
Open hearth or bessemer	$34.00

Skelp

Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.

	Per Lb.
Grooved, universal and sheared	1.90c.

Wire Rods
(No. 5 to 9/32 in.)

	Per Lb.
Pittsburgh, Chicago or Cleveland	2.00c.
Worcester, Mass.	2.10c.
Birmingham	2.00c.
San Francisco	2.45c.
Galveston	2.25c.

9/32 in. to 47/64 in. $3 a net ton higher. Quantity extras apply.

SOFT STEEL BARS

	Base per Lb.
Pittsburgh, Chicago, Gary, Cleveland, Buffalo and Birmingham	2.15c.
Detroit, delivered	2.25c.
Duluth	2.25c.
Philadelphia, delivered	2.47c.
New York	2.49c.
On cars dock Gulf ports	2.50c.
On cars dock Pacific ports	2.75c.

RAIL STEEL BARS

(For merchant trade)

Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham	2.15c.
On cars dock Tex. Gulf ports	2.50c.
On cars dock Pacific ports	2.75c.

BILLET STEEL REINFORCING BARS

(Straight lengths as quoted by distributers)

Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Cleveland, Youngstown or Sparrows Pt.	1.90c. to 2.15c.
Detroit, delivered	2.00c. to 2.25c.
On cars dock Tex. Gulf ports	2.25c. to 2.50c.
On cars dock Pacific ports	2.25c. to 2.50c.

RAIL STEEL REINFORCING BARS

(Straight lengths as quoted by distributers)

Pittsburgh, Chicago, Gary, Buffalo, Cleveland, Youngstown or Birmingham	1.90c. to 2.15c.
Detroit, delivered	2.00c. to 2.25c.
On cars dock Tex. Gulf ports	2.25c. to 2.50c.
On cars dock Pacific ports	2.25c. to 2.50c.

IRON BARS

Chicago and Terre Haute	2.15c.
Pittsburgh (refined)	3.75c.

COLD FINISHED BARS AND SHAFTING*

Pittsburgh, Buffalo, Cleveland, Chicago, and Gary	2.65c.
Detroit	2.70c.

* In quantities of 20,000 to 39,999 lb.

PLATES

	Base per Lb.
Pittsburgh, Chicago, Gary, Birmingham, Sparrows Point, Cleveland, Youngstown, Coatesville, Claymont, Del.	2.10c.
Philadelphia, del'd	2.15c.
New York, del'd.	2.29c.
On cars dock Gulf ports	2.45c.
On cars dock Pacific ports	2.60c.
Wrought iron plates, P'tg	3.80c.

FLOOR PLATES

Pittsburgh or Chicago	3.35c.
New York, del'd	3.71c.
On cars dock Gulf ports	3.70c.
On cars dock Pacific ports	3.95c.

STRUCTURAL SHAPES

	Base per Lb.
Pittsburgh, Chicago, Gary, Buffalo, Bethlehem or Birmingham	2.10c.
Philadelphia, del'd	2.215c.
New York, del'd	2.27c.
On cars dock Gulf ports	2.45c.
On cars dock Pacific ports	2.70c.

STEEL SHEET PILING

	Base per Lb.
Pittsburgh, Chicago or Buffalo	2.40c.
On cars dock Gulf ports	2.85c.
On cars dock Pacific ports	2.90c.

RAILS AND TRACK SUPPLIES

F.o.b. Mill

Standard rails, heavier than 60 lb., per gross ton	$40.00
Angle bars, per 100 lb.	2.70

F.o.b. Basing Points

Light rails (from billets) per gross ton	$40.00
Light rails (from rail steel) per gross ton	39.00

	Base per Lb.
Cut spikes	3.00c.
Screw spikes	4.55c.
Tie plates, steel	2.15c.
Tie plates, Pacific Coast ports	2.25c.
Track bolts, to steam railroads	4.15c.
Track bolts to jobbers, all sizes (per 100 counts)	65.5

Basing points on light rails are Pittsburgh, Chicago and Birmingham; on spikes and tie plates, Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minneaqua, Colo., Birmingham and Pacific Coast ports; on tie plates alone, Steelton, Pa., Buffalo; on spikes alone, Youngstown, Lebanon Pa., Richmond, Va.

SHEETS

Hot Rolled

	Base per Lb.
Pittsburgh, Gary, Birmingham, Buffalo, Sparrows Point, Cleveland, Youngstown, Middletown or Chicago	2.10c.
Detroit, delivered	2.20c.
Philadelphia, delivered	2.27c.
Granite City	2.20c.
On cars dock Pacific ports	2.60c.
Wrought iron, Pittsburgh	4.10c.

Cold Rolled*

Pittsburgh, Gary, Buffalo, Youngstown, Cleveland, Middletown or Chicago	3.05c.
Detroit, delivered	3.15c.
Granite City	3.15c.
Philadelphia, delivered	3.37c.
On cars dock Pacific ports	3.65c.

* Mill run sheets are 10c. per 100 lb. less than base; and primes only, 25c. above base.

Galvanized Sheets, 24 Gage

Pittsburgh, Chicago, Gary, Sparrows Point, Buffalo, Middletown, Youngstown or Birmingham	3.50c.
Philadelphia, delv'd	3.67c.
Granite City	3.60c.
On cars dock Pacific ports	4.00c.
Wrought iron, Pittsburgh	6.10c.

Electrical Sheets
(F.o.b. Pittsburgh)

	Base per Lb.
Field grade	3.20c.
Armature	3.55c.
Electrical	4.05c.
Motor	4.95c.
Dynamo	5.65c.
Transformer 72	6.15c.
Transformer 65	7.15c.
Transformer 58	7.65c.
Transformer 52	8.15c.

Silicon Strip in coils—Sheet price plus silicon sheet extra width extra plus 25c per 100 lb. for coils. Pacific ports add 70c. a 100 lb.

Long Ternes

No. 24 unassorted 8-lb. coating f.o.b. Pittsburgh or Gary	3.80c.
F.o.b. cars dock Pacific ports	4.50c.

Vitreous Enameling Stock, 20 Gage*

Pittsburgh, Chicago, Gary, Youngstown, Middletown or Cleveland	3.35c.
Detroit, delv'd	3.45c.
Granite City	3.45c.
On cars dock Pacific ports	3.95c.

TIN MILL PRODUCTS

Tin Plate

	Per Base Box
Standard cokes, Pittsburgh, Chicago and Gary (100 lb.)	$5.00
Standard cokes, Granite City (100 lb.)	5.10

Special Coated Manufacturing Ternes

	Per Base Box
Granite City	$4.00
Pittsburgh or Gary	4.30

Roofing Terne Plate
(F.o.b. Pittsburgh per Package, 112 Sheets)

	20x14 in.	20x28 in.
8-lb. coating I.C.	$6.00	$12.00
15-lb. coating I.C.	7.00	14.00
20-lb. coating I.C.	7.50	15.00
25-lb. coating I.C.	8.00	16.00
30-lb. coating I.C.	8.63	17.25
40-lb. coating I.C.	9.75	19.50

Black Plate, 29 gage and lighter*

Pittsburgh, Chicago and Gary	3.05c.
Granite City	3.15c.
On cars dock Pacific ports, boxed	4.00c.

* Black plate base price applies to 29 gage within certain width and length limitations.

HOT ROLLED STRIP

(Widths up to 12 in.)

	Base per Lb.
Pittsburgh, Chicago, Gary, Cleveland, Middletown, Youngstown or Birmingham	2.10c.
Detroit, delivered	2.20c.
On cars dock Pacific ports	2.70c.

Cooperage Stock

Pittsburgh & Chicago	2.20c.

COLD ROLLED STRIP*

	Base per Lb.
Pittsburgh, Youngstown or Cleveland	2.80c.
Chicago	2.90c.
Detroit, delivered	2.90c.
Worcester	3.00c.

* Carbon 0.25 and less.

Commodity Cold Rolled Strip

Pittsburgh, Youngstown, or Cleveland	2.95c.
Detroit, delivered	3.05c.
Worcester	3.35c.

COLD ROLLED SPRING STEEL

		Pittsburgh and Cleveland	Worcester
Carbon	0.26-0.50%	2.80c.	3.00c.
Carbon	0.51-0.75	4.30c.	4.50c.
Carbon	0.76-1.00	6.15c.	6.35c.
Carbon	1.01-1.25	8.35c.	8.55c.

WIRE PRODUCTS

(Carload lots, f.o.b. Pittsburgh, Chicago, Cleveland and Birmingham)

To Manufacturing Trade

	Per Lb.
Bright wire	2.60c.
Galvanized wire, base	2.60c.
Spring wire	3.20c.

To the Trade

	Base per Keg
Standard wire nails	$2.55
Coated nails	2.55
Cut nails, carloads	3.85

	Base per 100 Lb.
Annealed fence wire	$3.05
Woven wire fence, 15½ gage and heavier base col.	67
Fence posts (carloads), base col.	69
Single loop bale ties, base col.	56
Galvanized barbed wire on 80-rod spools (carloads) base col.	70
Twisted barbless wire, base col.	70

Note: Birmingham base same on above items, except spring wire.

STEEL AND WROUGHT IRON PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

F.o.b. Pittsburgh only on wrought iron pipe.

Butt Weld

Steel In.	Black	Galv.	*Wrought Iron* In.	Black	Galv.
⅛	.56	36	¼ & ⅜	+9	+30
¼ to ⅜	.59	43½	½	.24	6½
½	.63½	54	¾	.30	13
¾	.66½	58½	1 & 1¼	.34	19
1 to 3	.68½	60½	1½	.38	21½
			2	.37½	21

Lap Weld

2	.61	52½	2	.30½	15
2½ & 3	.64	55½	2½ to 3½	.34½	17½
3½ to 6.66		57½	4	.33½	21
7 & 8.65		55½	4½ to 8.32½		20
9 & 10.64½		55	9 to 12	.28½	15
11 & 12.63½		54			

Butt weld, extra strong, plain ends

⅛	.54½	41½	¼ & ⅜	+10	+43
½ to ⅜	.56½	45½	½	.25	9
½	.61½	53½	¾	.31	15
¾	.65½	57½	1 to 2	.38	22½
1 to 3	.67	60			

Lap weld, extra strong, plain ends

2	.59	51½	2	.33½	18½
2½ & 3	.63	55½	2½ to 4.39½		25½
3½ to 6.66½		59	4½ to 6.37½		24
7 & 8.65½		56	7 & 8	.38½	24½
9 & 10.64½		55	9 to 12	.32	20½
11 & 12.63½		54			

On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount of $4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or $2 a ton higher, on all butt weld 8 in. and smaller.

Boiler Tubes

Seamless Steel and Lap Weld Commercial Boiler Tubes and Locomotive Tubes. Minimum Wall.
(Net base prices per 100 ft. f.o.b. Pittsburgh in carload lots)

	Seamless Cold Drawn	Seamless Hot Rolled	Lap Weld Hot Rolled
1 in. o.d. 13 B.W.G.	$ 9.01	$ 7.82	....
1¼ in. o.d. 13 B.W.G.	10.67	9.26	....
1½ in. o.d. 13 B.W.G.	11.70	10.23	10.72
1¾ in. o.d. 13 B.W.G.	13.42	11.64	11.86
2 in. o.d. 13 B.W.G.	15.03	13.04	12.38
2¼ in. o.d. 13 B.W.G.	16.76	14.54	13.79
2¼ in. o.d. 12 B.W.G.	18.45	16.01	15.16
2½ in. o.d. 12 B.W.G.	20.21	17.54	16.58
2¾ in. o.d. 12 B.W.G.	21.42	18.59	17.54
3 in. o.d. 12 B.W.G.	22.48	19.50	18.35
3½ in. o.d. 11 B.W.G.	28.37	24.62	23.15
4 in. o.d. 10 B.W.G.	35.20	30.54	28.66
4½ in. o.d. 10 B.W.G.	43.04	37.35	35.22
5 in. o.d. 9 B.W.G.	54.01	46.87	44.25
6 in. o.d. 7 B.W.G.	82.93	71.96	68.14

Extras for less carload quantities:

40,000 lb. or ft. over	Base
30,000 lb. or ft. to 39,999 lb. or ft.	5%
20,000 lb. or ft. to 29,999 lb. or ft.	10%
10,000 lb. or ft. to 19,999 lb. or ft.	30%
5,000 lb. or ft. to 9,999 lb. or ft.	30%
2,000 lb. or ft. to 4,999 lb. or ft.	45%
Under 2,000 lb. or ft.	65%

CAST IRON WATER PIPE

Per Net Ton

*6-in. and larger, del'd Chicago	$54.80
6-in. and larger, del'd New York	52.20
*6-in. and larger, Birmingham	46.00
6-in. and larger, f.o.b. dock, San Francisco or Los Angeles	52.00
F.o.b. dock, Seattle	52.00
4-in. f.o.b. dock, San Francisco or Los Angeles	55.00
F.o.b. dock, Seattle	52.00

Class "A" and gas pipe, $3 extra 4-in. pipe is $3 a ton above 6-in.

Prices for lots of less than 200 tons. For 200 tons and over, 6-in. and larger is $45. Birmingham, and $53.80 delivered Chicago.

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland Birmingham or Chicago)

Per Cent Off List

Machine and carriage bolts: ½ in. and 6 in. and smaller	68½
Larger and longer up to 1 in.	66
1⅛ in. and larger	64
Lag bolts	66
Plow bolts, Nos. 1, 2, 3, and 7	68½
Hot pressed nuts, and c.p.c. and t-nuts, square or hex. blank or tapped: ½ in. and smaller	67
9/16 in. to 1 in. inclusive	64
1⅛ in. to 1½ in. incl.	62
1⅝ in. and larger	60

On the above items with the exception of plow bolts, there is an additional allowance of 10 per cent for full container quantities.

On all of the above items there is an additional 5 per cent allowance for carload shipments.

	U.S.S.	S.A.E.
Semi-fin. hexagon nuts ½ in. and smaller	67	70
9/16 to 1 in.	64	65
1⅛ in. and larger	62	62

In full container lots, 10 per cent additional discount.

Stove bolts in packages, with nuts loose	72½
Stove bolts in packages, with nuts attached, add 15% extra.	
Stove bolts in bulk	83½

On stove bolts freight is allowed up to 65c. per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.

Large Rivets

(½ in. and larger)

Base per 100 Lb.

F.o.b. Pittsburgh, Cleveland Chicago, Birmingham $3.40

Small Rivets

(7/16 in. and smaller)

Per Cent Off List

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham ...65 and 10

Cap and Set Screws

(Freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.)

Per Cent Off List

Milled hexagon head, cap screws, 1 in. dia. and smaller	50 and 10
Milled headless set screws, cut thread ¼ in. and larger	64
3/16 in. and smaller	73
Upset hex. head cap screws U.S.S. or S.A.E. thread 1 in. and smaller	70
Upset set screws, cup and oval points	75
Milled studs	52

Alloy Steel

Alloy Steel Blooms, Billets and Slabs

F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem. Base price, $56.00 a gross ton.

Alloy Steel Bars

F.o.b. Pittsburgh, Chicago, Buffalo, Bethlehem, Massillon or Canton.

Open-hearth grade, base	2.70c.
Delivered, Detroit	2.80c.

S.A.E. Series Numbers	Alloy Differential per 100 Lb.
2100 (1½% Nickel)	$0.75
2300 (3½% Nickel)	1.55
2500 (5% Nickel)	2.25
31 Nickel-chromium	0.70
3200 Nickel-chromium	1.85
3300 Nickel-chromium	3.80
3400 Nickel-chromium	3.20
4100 Chromium-molybdenum (0.15 to 0.25 Molybdenum)	0.55
4100 Chromium-molybdenum (0.25 to 0.40 Molybdenum)	0.75
4340 Chr.-Ni.-Mo.	1.65
4345 Chro.-Ni.-Mo.	1.85
4600 Nickel - molybdenum (0.20 to 0.30 Mo. 1.50 to 2.00 Ni.)	1.10
5100 Chrome steel (0.60-0.90 Cr.)	0.35
5100 Chrome steel (0.80-1.10 Cr.)	0.45
6100 Chromium spring steel	0.15
6100 Chromium-vanadium bar	1.20
6100 Chromium-vanadium spring steel	0.85
Chromium-nickel vanadium	1.50
Carbon-vanadium	0.35

These prices are for hot-rolled steel bars. The differential for most grades in electric furnace steel is 50c. higher. Slabs with a section area of 16 in. and 2½ in. thick or over take the billet base.

Alloy Cold-Finished Bars

F.o.b. Pittsburgh, Chicago, Gary, Cleveland or Buffalo, 3.35c. base per lb. Delivered Detroit, 3.45c., carlots.

STAINLESS & HEAT RESISTANT ALLOYS

(Base prices, cents per lb. f.o.b. Pittsburgh)

Chrome-Nickel

	No. 304	No. 302
Forging billets	21.25c.	20.40c.
Bars	25c.	24c.
Plates	29c.	27c.
Structural shapes	25c.	24c.
Sheets	36c.	34c.
Hot-rolled strip	23.50c.	21.50c.
Cold-rolled strip	30c.	28c.
Drawn wire	25c.	24c.

Straight Chrome

	No. 410	No. 430	No. 442	No. 446
Bars	18.50c.	19c.	22.50c.	27.50c.
Plates	21.50c.	22c.	25.50c.	30.50c.
Sheets	26.50c.	29c.	32.50c.	36.50c.
Hot stp.	17c.	17.50c.	24c.	35c.
Cold stp.	22c.	22.50c.	32c.	52c.

TOOL STEEL

High speed	67c.
High-carbon-chrome	43c.
Oil-hardening	24c.
Special	22c.
Extra	18c.
Regular	14c.

Prices for warehouse distribution to all points on or East of Mississippi River are 2c. a lb. higher. West of Mississippi quotations are 3c a lb. higher.

British and Continental

BRITISH

Per Gross Ton
f.o.b. United Kingdom Ports

Ferromanganese, export	£17 18s.
Tin plate, per base box	32s. to 33s.
Steel bars, open hearth	13£ 9s.
Beams, open hearth	12£ 2s. 6d.
Channels, open hearth	12£ 2s. 6d.
Angles, open hearth	12£ 2s. 6d.
Black sheets, No. 24 gage	17£ max.*; 17£ min.**
Galvanized sheets, No. 24 gage	19£ 10s. max.*; 19£ 10s. min.**

* Empire markets only.
** Other than Empire markets.

CONTINENTAL

Per Gross Ton, Belgian Francs
f.o.b. Continental Ports

Bars, merchant	1500
Plates	1750
Joists	1475
Sheets, thin	1900

Above price are minimum base to which 100 francs should be added to cover war risk insurance, freight charges, etc.

RAW MATERIALS PRICES

PIG IRON

No. 2 Foundry

F.o.b. Everett, Mass.	$24.00
F.o.b. Bethlehem, Birdsboro and Swedeland, Pa., and Sparrows Point, Md.	24.00
Delivered Brooklyn	26.50
Delivered Newark or Jersey City	25.53
Delivered Philadelphia	24.84
F.o.b. Neville Island, Erie, Pa., Toledo, Chicago, Granite City, Cleveland and Youngstown	23.00
F.o.b. Buffalo	23.00
F.o.b. Detroit	23.00
Southern, delivered Cincinnati	23.06
Northern, delivered, Cincinnati	23.44
F.o.b. Duluth	23.50
F.o.b. Provo, Utah	21.00
Delivered, San Francisco, Los Angeles or Seattle	26.50
F.o.b. Birmingham*	19.38

* Delivered prices on southern iron for shipment to northern points are 38c. a ton below delivered prices from nearest northern basing point on iron with phosphorus content of 0.70 per cent and over.

Malleable

Base prices on malleable iron are 50c. a ton above No. 2 foundry quotations at Everett, Eastern Pennsylvania furnaces, Erie and Buffalo. Elsewhere they are the same, except at Birmingham and Provo, which are not malleable iron basing points.

Basic

F.o.b. Everett, Mass.	$23.50
F.o.b. Bethlehem, Birdsboro, Swedeland and Steelton, Pa., and Sparrows Point, Md.	23.50
F.o.b. Buffalo	22.00
F.o.b. Neville Island, Erie, Pa., Toledo, Chicago, Granite City, Cleveland and Youngstown	22.50
Delivered Philadelphia	24.34
Delivered Canton, Ohio	23.89
Delivered Mansfield, Ohio	24.44
F.o.b. Birmingham	18.00

Bessemer

F.o.b. Buffalo	$24.00
F.o.b. Everett, Mass.	25.00
F.o.b. Bethlehem, Birdsboro and Swedeland, Pa.	25.00
Delivered Newark or Jersey City	26.53
Erie, Pa., and Duluth	24.00
F.o.b. Neville Island, Toledo, Chicago and Youngstown	23.50
F.o.b. Birmingham	24.00
Delivered Cincinnati	24.11
Delivered Canton, Ohio	24.89
Delivered Mansfield, Ohio	25.44

Low Phosphorus

Basing points; Birdsboro, Pa., Steelton, Pa., and Buffalo	$28.50

Gray Forge

Valley or Pittsburgh furnace	$22.50

Charcoal

Lake Superior furnace	$27.00
Delivered Chicago	30.34

Canadian Pig Iron

Per Gross Ton

Montreal

Foundry iron	$27.50 base
Malleable	28.00 base
Basic	27.50 base

Toronto

Foundry Iron	$25.50 base
Malleable	26.00 base
Basic	25.50 base

On all grades 2.25 per cent silicon and under is base. For each 25 points of silicon over 2.25 per cent an extra of 25c. is charged.

FERROALLOYS

Ferromanganese

F.o.b. New York, Philadelphia, Baltimore, Mobile or New Orleans.

Per Gross Ton

Domestic, 80% (carload) $100.00

Spiegeleisen

Per Gross Ton Furnace

Domestic, 19 to 21%	$32.00
Domestic, 26 to 28%	39.50

Electric Ferrosilicon

Per Gross Ton Delivered; Lump Size

50% (carload lots, bulk)	$69.50*
50% (ton lots, packed)	82.00*
75% (carload lots, bulk)	126.00*
75% (ton lots, packed)	142.00*

Bessemer Ferrosilicon

F.o.b. Furnace, Jackson, Ohio

Per Gross Ton

10.00 to 10.50% $32.50

For each additional 0.50% silicon up to 12%, 50c. per ton is added. Above 12% add 75c. per ton.

For each unit of manganese over 2%, $1 per ton additional.

Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Silvery Iron

Per Gross Ton

F.o.b. Jackson, Ohio, 5.00 to 5.50% $27.50

For each additional 0.5% silicon up to 12%, 50c. a ton is added. Above 12% add 75c. a ton.

The lower all-rail delivered price from Jackson or Buffalo is quoted with freight allowed. Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Manganese, each unit over 2%, $1 a ton additional. Phosphorus 0.75% or over, $1 a ton additional.

Ferrochrome

Per Lb. Contained Cr., Delivered Carlots, Lump Size, on Contract

4 to 6% carbon	11.00c.
2% carbon	17.50c.
1% carbon	18.50c.
0.10% carbon	20.50c.
0.06% carbon	21.00c.

Spot prices are ¼c. per lb. of contained chromium higher.

Silico-Manganese

Per Gross Ton, Delivered, Lump Size, Bulk, on Contract

3% carbon	$98.00*
2.50% carbon	103.00*
2% carbon	108.00*
1% carbon	118.00*

Other Ferroalloys

Ferrotungsten, per lb. contained W del., carload	$2.00
Ferrotungsten, 100 lbs. and less	2.25
Ferrovanadium, contract, per lb. contained V., delivered	$2.70 to $2.90†
Ferracolumbium, per lb. contained columbium, f.o.b. Niagara Falls, N. Y., ton lots	$2.25†
Ferrocarbontitanium, 15 to 18% Ti, 7 to 8% C, f.o.b. furnace carload and contract per net ton	$142.50
Ferrocarbontitanium, 17 to 20% Ti, 3 to 5% C, f.o.b. furnace, carload and contract, per net ton	$157.50
Ferrophosphorus, electric, or blast furnace material, in carloads, f.o.b. Anniston, Ala., for 18%, with $3 unitage, freight equalized with Rockdale, Tenn., per gross ton	$58.50
Ferrophosphorus, electrolytic 23-26% in car lots, f.o.b. Monsanto (Siglo), Tenn., 24%, per gross ton, $3 unitage, freight equalized with Nashville	$75.00
Ferromolybdenum, per lb. Mo. f.o.b. furnace	95c.
Calcium molybdate, per lb. Mo. f.o.b. furnace	80c.
Molybdenum oxide briquettes 48-52% Mo. per lb. contained Mo. f.o.b. Langeloth, Pa.	80c.

* Spot prices are $5 per ton higher.
† Spot prices are 10c. per lb. of contained element higher.

*ORES

Lake Superior Ores

Delivered Lower Lake Ports

Per Gross Ton

Old range, bessemer, 51.50%	$5.25
Old range, non-bessemer, 51.50%	5.10
Mesaba, bessemer, 51.50%	5.10
Mesaba, non-bessemer, 51.50%	4.95
High phosphorus, 51.50%	4.85

Foreign Ores*

C.i.f. Philadelphia or Baltimore, Exclusive of Duty

Per Unit

Algerian, low P, Cu free, dry, 55 to 58% Fe	12c.
Swedish, low P, 68% Fe	12c.
Swedish, basic or foundry, 65% Fe	11c.
Caucasian, washed, 52% Mn	49c.
African, Indian, 44 to 48% Mn.	46c.
African, Indian, 49 to 51% Mn.	48c.
Brazilian, 46 to 48% Mn.	46c.
Cuban, del'd, duty free, 51% Mn	61c.

Per Short Ton Unit

Tungsten, Chinese, Wolframite, duty paid, delivered	$23.00 to $24.00
Tungsten, domestic, scheelite delivered	23.00 to 25.00
Chrome ore, lump c.i.f. Atlantic Seaboard, per gross ton: South African (low grade)	$19.00
Rhodesian, 45%	22.00
Rhodesian, 48%	26.00 to $27.00
Turkish, 48-49%	27.00 to 28.00
Turkish, 45-46%	25.00 to 26.00
Turkish, 40-41%	22.00
Chrome concentrates c.i.f. Atlantic Seaboard, per gross ton: Turkish, 48-49%	$27.00 to $28.00

* All foreign ore prices are nominal

FLUORSPAR

Per Net Ton

Domestic washed gravel, 85-5, f.o.b. Kentucky and Illinois mines, all rail	$21.00
Domestic, f.o.b. Ohio River landing barges	21.00
No. 2 lump, 85-5, f.o.b. Kentucky and Ill. mines	$20.00 to 22.00
Foreign, 85% calcium fluoride, not over 5% silicon, c.i.f. Atlantic ports, duty paid	$25.00 to $25.50
Domestic No. 1 ground bulk, 96 to 98%, calcium fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines	$31.00
ditto, in bags, f.o.b., same mines	$32.60

FUEL OIL

Per Gal.

No. 3, f.o.b. Bayonne, N. J.	5.10c.
No. 6, f.o.b. Bayonne, N. J.	3.57c.
No. 5 Bur. Stds., del'd Chicago	3.25c.
No. 6 Bur. Stds., del'd Chicago	2.75c.
No. 3 distillate, del'd Cleve'd.	5.25c.
No. 4 industrial, del'd Cleve'd.	5.00c.
No. 5 industrial, del'd Cleve'd.	4.25c.
No. 6 industrial, del'd Cleve'd.	3.875c.

COKE

Per Net Ton

Furnace, f.o.b. Connellsville, Prompt	$4.00 to $4.25
Foundry, f.o.b. Connellsville, Prompt	5.25 to 5.50
Foundry, by - product Chicago ovens	10.50
Foundry, by - product del'd New England	12.50
Foundry, by - product del'd Newark or Jersey City	11.38 to 11.90
Foundry, by - product Philadelphia	11.13
Foundry, by - product delivered Cleveland	11.05
Foundry, by - product delivered Cincinnati	10.50
Foundry, Birmingham	7.50
Foundry, by - product del'd St. Louis industrial district	10.75 to 11.00
Foundry, from Birmingham, f.o.b. cars dock Pacific ports	14.75

IRON AND STEEL WAREHOUSES

PITTSBURGH*

	Base per Lb.
Plates	3.40c.
Shapes	3.40c.
Soft steel bars and small shapes	3.35c.
Reinforcing steel bars	2.70c.
Cold finished bars and screw stock	3.65c.
Hot rolled strip	3.60c.
Hot rolled sheets	3.35c.
Galv. sheets (24 ga.) 500 lb. to 1499 lb.	4.75c.
Wire, black, soft annealed	3.30c.
Wire, galv., soft	3.55c.
Track spikes (1 to 24 kegs)	3.60c.
Wire nails (in 100-lb. kegs)	2.80c.

On plates, structurals, bars, strip and hot rolled sheets, base applied to orders of 400 to 1999 lb.
On reinforcing bars base applies to orders of less than one ton and includes switching and starting charge.
All above prices for delivery within the Pittsburgh switching district.

NEW YORK

	Base per Lb.
*Plates, ¼ in. and heavier	3.76c.
*Structural shapes	3.75c.
*Soft steel bars, round	3.84c.
Iron bars, Swed. charcoal	9.50c.
**Cold-fin. shafting and screw stock:	
Rounds, squares, hexagons	4.09c.
Flats up to 12 in. wide	4.09c.
Cold-rolled strip soft and quarter hard	3.51c.
*Hot-rolled strip, soft O.H.	3.96c.
*Hot-rolled sheets (8-30 ga.)	3.58c.
**Galv. sheets (24 ga.)	5.23c.
**Galv. sheets (24 ga.)	4.75c. to 5.00c.
Cold-rolled sheets (20 ga.)	
Standard quality	4.60c.
Deep drawing	4.85c.
Stretcher leveled	5.10c.
SAE, 2300, hot-rolled	7.35c
SAE, 3100, hot-rolled	5.90c.
SAE, 6100, hot-rolled annealed	8.75c.
SAE, 2300, cold-rolled	8.59c.
SAE, 3100, cold-rolled, annealed	8.19c.
*Floor plate, ⅛ in. and heavier	5.56c.
Standard tool steel	12.50c.
Wire, black, annealed	4.85c
Wire, galv. (No. 9)	4.70c.
O. H. spring steel, flats	4.70c.
Common wire nails, per keg	3.50c.

*For lots 400 to 1999 lb.
**For lots less than 1500 lb.

CHICAGO

	Base per Lb.
Plates and structural shapes	3.55c.
Soft steel bars, rounds and angles	3.50c.
Soft steel squares, hexagons, channels and Tees	3.65c.
Hot rolled strip	3.60c.
Floor plates	5.15c.
Hot rolled sheets	3.35c.
Galvanized sheets	4.85c.
Cold rolled sheets	4.30c.
Cold finished carbon bars	3.75c.

Above prices are subject to deductions and extras for quantity and are f.o.b. consumer's plant within Chicago free delivery zone.

CLEVELAND

	Base per Lb.
Plates	3.40c.
Structural shapes	3.58c.
Soft steel bars	3.25c.
Cold-fin. bars (1500 lb., over.)	3.75c.
Hot-rolled strip	3.50c.
Cold rolled sheets	4.05c.
Cold-finished strip	3.20c.
Galvanized sheets (No. 24)	4.72c.
Hot-rolled sheets	3.35c.
Floor plates, 3/16 in. and heavier	5.18c.
Black ann'l'd wire, per 100 lb.	$3.10
No. 9 galv. wire, per 100 lb.	3.50
Com. wire nails, base per keg	2.75
Hot rolled alloy steel (3100)	5.85c.
Cold rolled alloy steel (3115)	6.75c.

Prices shown on hot rolled bars, strip, sheets, shapes and plates are for 400 to 1999 lbs. Alloy steel, 1000 lb. and over; galvanized sheets, 150 to 1499 lb.; cold rolled sheets, 400 to 1499 lb.

ST. LOUIS

	Base per Lb.
Plates and structural shapes	3.47c.
Bars, soft steel (round and flats)	3.62c.
Bars, soft steel (squares, hexagons, ovals, half ovals and half rounds)	3.77c.
Cold fin. rounds, shafting, screw stock	4.02c.
Galv. sheets (24 ga.)	4.52c.
Hot rolled sheets	3.38c.
Galv. corrugated sheets, 24 ga. and heavier*	4.57c.
Structural rivets	5.02c.

* No. 26 and lighter take special prices.

BOSTON

	Base per Lb.
Structural shapes, 3 in. and larger	3.85c.
Plates, ¼ in. and heavier	3.85c.
Bars	3.88c.
Heavy hot rolled sheets	3.71c.
Hot rolled sheets	4.21c.
Hot rolled annealed sheets	4.61c.
Galvanized sheets	4.61c.
Cold rolled sheets	4.71c.

The following quantity differentials apply: Less than 100 lb., plus $1.50 per 100 lb.; 100 to 399 lb. plus 50c.; 400 to 1999 lb. base; 2000 to 9999 lb. minus 20c.; 10,000 to 39,999 lb. minus 30c.; 40,000 lb. and over minus 40c.

BUFFALO

	Base per Lb.
Plates	3.62c.
Floor plates	5.25c.
Struc. shapes	3.40c.
Soft steel bars	3.35c.
Reinforcing bars (20,000 lb. or more)	2.15c.
Cold-fin. flats, squares, rounds, and hex.	3.65c.
Hot-rolled sheets, 3/16 x 14 in. to 48 in. wide incl., also sizes No. 8 to 30 ga.	3.35c.
Galv. sheets (24 ga.)	4.70c.
Bands and hoops	3.82c.

NEW ORLEANS

	Base per Lb.
Mild steel bars	4.20c.
Reinforcing bars	3.24c.
Structural shapes	4.10c.
Plates	4.10c.
Hot-rolled sheets, No. 10	4.35c.
Steel bands	4.75c.
Cold-finished steel bars	5.10c.
Structural rivets	4.85c.
Boiler rivets	4.85c.
Common wire nails, base per keg	3.55
Bolts and nuts, per cent off list	60

REFRACTORIES PRICES

Fire Clay Brick

	Per 1000 f.o.b. Works
Super-duty brick, at St. Louis	$60.80
First quality Pennsylvania, Maryland, Kentucky, Missouri and Illinois	47.50
First quality, New Jersey	52.50
Second quality, Pennsylvania, Maryland, Kentucky, Missouri and Illinois	42.75
Second quality, New Jersey	49.00
No. 1 Ohio	39.90
Ground fire clay, per ton	7.10

Silica Brick

	Per 1000 f.o.b. Works
Pennsylvania	$47.50
Chicago District	55.10
Birmingham	47.50
Silica cement per net ton (Eastern)	8.55

Chrome Brick

	Net per Ton
Standard f.o.b. Baltimore, Plymouth Meeting and Chester	$50.00
Chemically bonded f.o.b. Baltimore, Plymouth Meeting and Chester, Pa.	50.00

Magnesite Brick

	Net per Ton
Standard f.o.b. Baltimore and Chester	$72.00
Chemically bonded, f.o.b. Baltimore	61.00

Grain Magnesite

	Net per Ton
Imported, f.o.b. Baltimore and Chester, Pa. (in sacks)	(—)*
Domestic, f.o.b. Baltimore and Chester in sacks	40.00
Domestic, f.o.b. Chewelah, Wash. (in bulk)	22.00

* None available.

PHILADELPHIA

	Base per Lb.
*Plates, ¼-in. and heavier	3.55c.
*Structural shapes	3.55c.
*Soft steel bars small shapes, iron bars (except bands)	3.85c.
‡Reinforc. steel bars, square and deformed	2.76c.
Cold-finished steel bars	4.16c.
*Steel hoops	4.35c.
*Steel bands, No. 12 and 3/16 in. incl.	3.85c.
*Spring steel	5.00c.
*Hot-rolled anneal. sheets	3.55c.
†Galvanized sheets (No. 24)	4.75c.
*Diam. pat. floor plates, ¼ in.	5.25c.

*For quantities between 400 and 1999 lb.
†For 10 bundles or over.
‡For one to five tons.

BIRMINGHAM

	Base per Lb.
Bars and bar shapes	3.50c.
Structural shapes and plates	3.55c.
Hot rolled sheets No. 10 ga.	3.35c.
Galvanized sheets No. 24 ga.	4.75c.
	or more
Strip	3.60c.
Reinforcing bars	3.50c.
Floor plates	5.88
Cold finished bars	4.43
Machine and carriage bolts	50 & 10 off list
Rivets (structural)	$4.60 base

On plates, shapes, bars, hot-rolled strip, heavy hot-rolled sheets, the base applies on 400 to 1999 lb. All prices are f.o.b. consumer plant.

PACIFIC COAST

	Base per Lb.		
	San Francisco	Los Angeles	Seattle
Plates, tanks and U. M.	3.35c.*	3.80c.	3.40c.
Shapes, standard	3.35c.*	3.80c.	3.50c.
Soft steel bars	3.50c.	3.50c.	4.00c.
Reinforcing bars, f.o.b. cars dock Pacific ports	2.525c.	open.	2.975c.
Hot-rolled sheets (No. 10)	3.40c.	4.10c.	3.70c.
Galv. sheets (No. 24 and lighter)	5.15c.	5.00c.	4.75c.
Galv. sheets (No. 22 and heavier)	5.40c.	5.00c.	4.75c.
Cold-finished steel Rounds	6.80c.	6.60c.	7.00c.
Squares and hexagons	8.05c.	7.85c.	8.25c.
Flats	8.55c.	8.35c.	8.25c.
Common wire nails—base per keg less carload	3.25c.	3.25c.	3.15c.

* Plates over 1 in. and shapes over 6 in. are 25c. per 100 lb. higher.
All items subject to differentials for quantity.

ST. PAUL

	Base per Lb.
Mild steel bars, rounds	4.10c.
Structural shapes	4.00c.
Plates	4.00c.
Cold-finished bars	4.83c.
Hot-rolled annealed sheets, No. 24	4.75c.
Galvanized sheets, No. 24	5.00c.

On mild steel bars, shapes and plates the base applies on 400 to 14,999 lb. On hot-rolled sheets, galvanized sheets and cold-rolled sheets base applies on 15,000 lb. and over. Base on cold-finished bars is 1000 lb. and over of a size.

DETROIT

	Base per Lb.
Soft steel bars	3.43c.
Structural shapes	3.65c.
Plates	3.60c.
Floor plates	5.27c.
Hot-rolled sheets, 8 to 30 gages above 12 in. and 3/16 in., 24 in. to 48 in. wide	3.43c.
Cold-rolled sheets	4.50c.
*Galvanized sheets	4.84c.
Hot rolled strip, under 12 gage	3.68c.
Hot rolled strip, above 12 gage	3.43c.
Cold-finished bars	3.80c.
Cold-rolled strip	3.40c.
Hot-rolled alloy steel (SAE 3100 Series)	5.97c.
Cold-rolled alloy (SAE 2300)	8.45c.

Quantity extras apply to all items.
*Price applies only in metropolitan Detroit.

CAST IRON PIPE

Board of Harrison Township Commissioners, Macomb County, Mount Clemens, Mich., plans main pipe line for water supply in township, about six miles. Cost close to $50,000.

Buhl, Minn., plans pipe line extensions in water system. Fund of $29,268 has been secured through Federal aid. Work is scheduled to begin early in spring.

McFarland, Wis., plans pipe lines for water system and other waterworks installation. Cost about $36,000. Financing will be arranged through Federal aid. W. G. Kirchoffer, 22 North Carroll Street, Madison, Wis., is consulting engineer.

Waxham, N. C., has plans for pipe lines for water system and other waterworks installation. Fund of $119,000 has been arranged through Federal aid for this and sewage system. J. B. McCrary Co., Inc., Atlanta, Ga., is consulting engineer.

Anadarko, Okla., plans pipe line extensions and replacements in water system, and other waterworks installation. Cost about $85,000, of which approximately $34,360 will be secured through Federal aid.

Flint, Mich., plans pipe line extensions and replacements in water system. Fund of about $130,000 is being secured through Federal aid.

Adrian, Mich., plans pipe line extensions and improvements in water system, and other waterworks installation. Cost about $175,000. Walter E. Frazier is city engineer. A. H. Smith Co., 112 East Woodruff Avenue, Toledo, Ohio, is consulting engineer.

Apple River, Ill., has plans for pipe lines for water system and other waterworks installation. Bond issue has been approved and further financing will be carried out through Federal aid to make total fund of about $30,000 for project. Cullen & Bartels, Lincoln Building, Dubuque, Iowa, are consulting engineers.

Yellville, Ark., plans pipe line extensions in water system; also elevated steel tank and tower, about 50,000-gal. capacity, fire hydrants and other waterworks installation. Cost about $48,000.

. . . PIPE LINES . . .

United Gas Pipe Line Co., Duncanville Highway, Dallas, Tex., plans welded steel pipe lines for new natural gasoline plant to be built at Koran (Bossier County), La., near Lake Bistineau, including line from junction of present main pipe lines from Sligo and Bistineau gas field areas to plant site for natural gas transmission, including compressor station, control house and other facilities to provide for capacity of 60,000,000 cu. ft. per day. Also new line from plant to terminal loading station near Elm Grove, about 7½ miles, for gasoline transmission for loading in tank cars. Steel storage tanks, with vapor recovery equipment and other structures will be constructed at last noted place. Entire project will cost about $450,000.

Los Angeles Water and Power Bureau, 207 South Broadway, Los Angeles, asks bids until March 20 for welded steel pipe for replacement of sections of steel siphons on Los Angeles aqueduct as follows: 1049 ft. of 8½-ft. inside diameter electric fusion welded steel pipe, with protective coating, for siphon No. 5, Dove Springs Canyon; 697 ft. of similar size pipe, with protective coating, for siphon No. 6, San Antonio Canyon; 2123 ft. of 10-ft. inside diameter similar welded steel pipe, with protective coating, for siphon No. 16, Deadman Canyon; and 3128 ft. of 10-ft. similar pipe, with protective coating, for siphon No. 17, Soledad Canyon. All pipe to be ⅜-in. steel shell (Specifications 3315).

Constructing Quartermaster, McCord Field, Tacoma, Wash., asks bids until March 20 for pressure pipe lines for gasoline fueling system for Air Corps field, with auxiliary equipment (Circular 6888-44).

Montana-Dakota Utilities Co., 831 Second Avenue South, Minneapolis, Minn., will operate new welded steel pipe line to be built by Northern Pipeline Co., Casper, Wyo., from Billy Creek, Wyo., gas field to Casper, about 100 miles, for natural gas transmission, recently noted in these columns. Line will be leased to first noted utility, which will furnish service at Sheridan and Buffalo, Wyo., and neighboring communities. Cost over $500,000. Work will be carried out this spring.

Pascagoula, Miss., closes bids March 16 for pipe lines for natural gas distribution system, including main welded steel pipe line for connection with supply source; also for control station, meter house and other operating facilities. Bond issue of $360,000 has been authorized for project. F. F. Joseph, Glenmora, La., is consulting engineer.

Constructing Quartermaster, Sacramento Air Depot, Sacramento, Cal., asks bids until March 12 for about 4500 ft. of welded steel pipe; also for steel pipe nipples, valves and fittings, and 60 ft. of cast iron water pipe, water separators, etc. (Circular 6870-11).

Metropolitan Utilities District, Tenth and Harney Streets, Omaha, Neb., plans pipe lines for gas distribution in district No. 877, recently created. Harry Trustin is city engineer.

Public Works Officer, Naval Air Station, Pensacola, Fla., has let contract to Aqua Systems, Inc., 2443 Third Avenue, New York, at $112,883 for pipe lines and accessories for gasoline fueling system at new base air field at Felton, Fla. (Specifications 9564).

REINFORCING STEEL

. . . Awards of 9950 tons; 3250 tons in new projects

AWARDS

ATLANTIC STATES

1225 **Tons,** Rockaway, N. Y., Long Island Railroad grade elimination, to Jones & Laughlin Steel Corp., Pittsburgh, through Tully & DiNapoli, contractors.

900 **Tons,** Pittsburgh, building, to Rust Engineering Co., Pittsburgh.

550 **Tons,** New Haven, Conn., housing project, to Buffalo Steel Co., Buffalo; W. L. Crow Construction Co., New York, contractor.

165 **Tons,** New Jersey State highway, route 29, to Joseph T. Ryerson & Son, Inc., Jersey City, N. J.

120 **Tons,** Milford, Conn., bridge, to Concrete Steel Co., Boston.

100 **Tons,** Plaistow, N. H., bridge, to Truscon Steel Co., Boston.

SOUTH AND CENTRAL

750 **Tons,** Tampa, Fla., housing project, to Truscon Steel Co., Youngstown.

600 **Tons,** Ironton, Ohio, flood wall. This item was erroneously reported in our issue of Feb. 15 as awarded to Pollak Steel Co., Cincinnati.

390 **Tons,** Detroit, Parkside housing, unit A, to Truscon Steel Co., Youngstown, through O. W. Burke Co., contractor.

374 **Tons,** Chicago, section S9C, subway, to Olney J. Dean Steel Co., Chicago, through Kenny Construction Co., Chicago.

327 **Tons,** Cleveland, public opening for city of Cleveland, to Patterson-Leitch Co., Cleveland.

270 **Tons,** Orlando, Fla., post office, to Truscon Steel Co., Youngstown.

240 **Tons,** Cincinnati, bars for city, to West Virginia Rail Steel Co., Huntington, W. Va.

200 **Tons,** Cleveland, superstructure for municipal power plant, to Republic Structural Iron Works, Cleveland.

195 **Tons,** Clinton, Okla., bridge, to Capitol Steel & Iron Co., Oklahoma City, and Sheffield Steel Corp., Kansas City, through Moran-Buckner Co.

175 **Tons,** Roanoke, Va., Veterans' hospital, to Truscon Steel Co., Youngstown.

160 **Tons,** Detroit, Parke Davis animal house, to Truscon Steel Co., through Eslinger-Misch Co., contractors.

150 **Tons,** Key West, Fla., hangar foundations, to Truscon Steel Co., Youngstown.

115 **Tons,** Chicago, bridge, 79th and Kedzie Streets, to Concrete Steel Co., New York, through Kenny Construction Co., Chicago.

100 **Tons,** Toledo, housing project, to Hausman Steel Co., Inc., Toledo.

100 **Tons,** Chicago, Bunte Bros. Candy Co. building, to Joseph T. Ryerson & Son, Inc., Chicago, through Charles B. Johnson & Son, Inc.

WESTERN STATES

1050 **Tons,** Odair, Wash., Grand Coulee Dam (Invitation 38140-A), to Bethlehem Steel Co., San Francisco.

850 **Tons,** Earp, Cal., Parker power plant (Invitation 44452-A), to Columbia Steel Co., San Francisco.

470 **Tons,** Scotia, Cal., Eel River Bridge at Robinson Ferry, to Columbia Steel Co., San Francisco, through Engineers, Ltd., San Francisco, contractor.

250 **Tons,** Odair, Wash., Grand Coulee Dam (Invitation B-38-139-A), to Bethlehem Steel Co., San Francisco.

157 **Tons,** Acequia, Idaho, Bureau of Reclamation (Invitation A-5800-A), to Bethlehem Steel Co., San Francisco.

HAWAII

550 **Tons,** Wheeler Field, T. H., 600-man barracks, to Soule Steel Co., Los Angeles, through Robert E. McKee, Los Angeles, contractor.

PENDING REINFORCING BAR PROJECTS

ATLANTIC STATES

600 **Tons,** Washington, Grocers Finance Co.

400 **Tons,** Hudson, N. Y., Lone Star Cement Co., bids in.

150 **Tons,** Hamden, Conn., underpass and bridge.

100 **Tons,** Erie County, N. Y., grade crossing elimination, project R.C.2576-S.H. 1965-P.S.C. 4666.

SOUTH AND CENTRAL

1300 **Tons,** Carrville, La., Federal hospital; A. Fornell Blair, Decatur, Ga., low bidder on general contract.

600 **Tons,** Toledo, low pressure pumping station for city; A. Bentley & Sons, low bidder.

500 **Tons,** Toledo, high pressure pumping station for city; A. Bentley & Sons, low bidder.

500 **Tons,** Nimrod, Ark., dam, Perry and Yell Counties; Russ Mitchell, Inc., and Brown & Root, Houston, Tex., low bidders on general contract.

275 **Tons,** Richmond, Va., Southern Biscuit Co. factory.

250 **Tons,** Detroit, school, Sisters of St. Dominic.

175 **Tons,** Akron, Ohio, Elizabeth Park housing project; bids March 8.

150 **Tons,** Jefferson County, Mo., highway bridge; O'Dell & Riney Construction Co., Hannibal, Mo., low bidder on general contract.

WESTERN STATES

700 **Tons,** Mare Island, Cal., dry dock (Specification 9450); bids in.

CANAL ZONE

428 **Tons,** Panama Canal schedule No. 3915.

Treasury Buys 41,000 Tons of Manganese

WASHINGTON—The Treasury Department's procurement division on Monday awarded contracts totaling $1,188,768 for 41,000 tons of manganese ore. The awards represent the largest manganese purchase thus far made under the Government's strategic and critical materials purchasing program. The successful bidders were: C. Tennant Sons Co., New York, 2000 tons grade A Philippine ore, $60,288; Commercial Engineering Co., Washington, 8000 tons grade A Canadian ore, $240,000; L. W. Lambert, Upper Lake County, Cal., 18,000 tons grade B Philippine ore, $561,600. Derivatives, Inc., and Tonerde, Inc., both of New York, 2000 tons grade B South African ore, $47,040, and 11,000 tons grade B, South African, Brazil, and British Indian ore, $279,840.

. . . OBITUARY . . .

LORING F. HOSLEY, vice-president and general manager of the Indian Motorcycle Co., Springfield, Mass., died suddenly Feb. 28 at his home. He was born in Springfield 48 years ago. After graduating from college he was first associated with the Kelly-Springfield Tire Co., then respectively with the Mercer Automobile Co. and the Indian Motorcycle Co.

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STEPHEN J. WISSING, secretary Gluntz Brass & Aluminum Foundry Co., Cleveland, died Feb. 28, aged 47 years.

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THOMAS LINTON ROBINSON, former president of Republic Rubber Co., Youngstown, died Feb. 19 in Zurich, Switzerland. He was 59 years old.

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DE WITT PAGE, formerly president of the New Departure Division, General Motors Corp., Bristol, Conn., died of a heart attack in Miami, Fla., on Feb. 28, aged 70 years. He was also a vice-president and director of General Motors Corp. He joined the old New Departure Mfg. Co. in 1892.

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M. STEWART DRAVO, district sales manager, Pittsburgh office, Crucible Steel Co. of America, died Feb. 20, aged 56 years. Mr. Dravo had been manager for the past 20 years and was with the company for 31 years. He received his formal education at Shadyside Academy and Trinity College.

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C. W. WOOD, manager of the Janesville, Wis., zone of the Chevrolet Motor Co., died Feb. 28 in his home in Rockford, Ill., after a short illness of scarlet fever. He was a native of Andover, Ohio, and joined Chevrolet in Detroit in 1930. He went to Janesville from the Davenport district last August.

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HARRY EGERTON LOWE, who retired as sales engineer of the Detroit Edison Co. in 1938 after 25 years' service, died Feb. 24 at Daytona Beach, Fla. Mr. Lowe was born in Worksop, England, in 1874.

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WILLIAM W. NICHOLS, mechanical engineer and vice-president of D. P. Brown & Co., died Feb. 24 at St. Petersburg, Fla., of a heart attack at the age of 69. Mr. Nichols was born in 1870 in Brooklyn, N. Y. He went to Detroit in 1907 when he first became associated with D. P. Brown & Co. He held an honorary degree in mechanical engineering from the University of Detroit, was a member of the American Society of Mechanical Engineers, the Institute of Maintenance of London, the Engineering Society of Detroit and the Detroit Board of Commerce.

Mesaba Range Led in 1939 Ore Shipments

CLEVELAND—The annual report on mine shipments has been issued by the Lake Superior Iron Ore Association, Cleveland. The Missabe Mountain mine led in shipments from the Mesaba Range in 1939 with 2,739,250 gross tons, followed by the Hull Rust mine with 2,591,464 gross tons; the Mahoning with 2,525,921 tons and the Hill Annex with 2,166,603 tons. Total shipments from the Mesaba Range were 30,314,857 gross tons.

Pioneer mine led the Vermilion Range with 566,171 gross tons. The range shipped a total of 1,417,360 tons. Zenith mine was in second place with shipments of 463,833 tons.

On the Cuyuna Range, Mahnomen mine shipped 249,778 tons out of a grand total for the range of 1,290,673 tons. Montreal mine on the Gogebic Range shipped 974,718 tons, followed by Newport with 607,404 tons and West Davis with 545,941 tons. Total shipments from the range were 5,345,558 tons.

Heaviest shipments of the 4,907,623 tons total shipped from the Marquette Range, came from Negaunee with 679,680 tons, followed by Maas with 622,703 and Cliffs Shaft with 591,370 tons. Penn mines led the Menominee Range with 442,032 tons, followed by Bengal with 300,691 tons. The Menominee Range shipped a total of 2,160,596 tons.

556,000 Steel Workers On Payrolls in January

EMPLOYMENT and payrolls of the steel industry during January were slightly lower than in December, but were substantially above January a year ago, according to the American Iron and Steel Institute.

The average of 556,000 employees at work in the industry during January compares with 563,000 in December and 451,000 in January 1939. Total payrolls of the industry amounted to $82,827,000 in January as against $84,537,000 in December and $59,348,000 in January of last year.

The 496,000 wage-earning employees in the industry last month earned an average of 83.5c. per hour during the month, which compares with the December average of 85.0c. an hour and with 82.6c. an hour in January 1939.

Wage earners worked an average of 37.1 hr. per week in January, as against 36.9 in December and 32.0 in January 1939.

Mesta Expansion Will Cost $1,000,000, Iversen Announces

PITTSBURGH — Mesta Machine Co. is enlarging its forging facilities at a cost of $1,000,000, according to Lorenz Iversen, president. The new construction includes a 6000 ton forging press, with accessories, heat treating furnaces and product finishing facilities. Completion of this project is expected by early spring.

The company reported net earnings for 1939 of $2,715,427, equivalent to $2.71 a share. This compared with a net return in 1938 of $2,909,957 or $2.91 a share.

Unfilled tonnage on the books at the end of 1939 amounted to $10,797,740 compared with $7,832,525 at the end of 1938.

Mr. Iversen said that orders and contracts booked in the last quarter of 1939 and the first two months of 1940 have been beyond expectations and predicted a fair operating rate in the balance of this year.

Night Shift at Clark Plant

CLEVELAND—A night force has been installed at the plant of the Clark Controller Co., which manufactures control and starting equipment serving a variety of plant equipment purposes. Business in the first two months of 1940 was about 20 per cent better than in the corresponding period of last year. The plant employs about 350 persons.

Tractor Export Demand Gains

CLEVELAND — Export demand for tractors has been favorable here recently, according to officials of Cleveland Tractor Co. Fifteen diesels recently were shipped to the Argentine. In January, Sweden got 40 Cletracs. France, Great Britain and Australia have been in the market, and the latest inquiry is from Holland.

PLANT EXPANSION AND EQUIPMENT BUYING

NORTH ATLANTIC

Sinclair Refining Co., 630 Fifth Avenue, New York, plans new bulk oil terminal on waterfront at Corpus Christi, Tex., including dock with tanker loading facilities, pumping station and other units; also steel tanks, with pipe line connections, etc., in tidewater district near port. Cost close to $450,000. Main offices in Texas are in Gulf Building, Houston.

Signal Corps Procurement District, Army Base, Fifty-eighth Street and First Avenue, Brooklyn, asks bids until March 15 for 2,080,000 ft. of wire (Circular 296); until March 26 for cable assemblies, cable studs, cable reels, plug jackets, etc. (Circular 311).

Department of Public Works, New York, Municipal Building, has filed plans for mechanical buildings on Berrian Boulevard, from Forty-seventh to Steinway Streets, Long Island City, for sewage treatment works, including pump and blower station, return sludge pumping plant, sludge thickening tanks building and meter register station, all one-story. Cost about $625,000 with equipment. Warden H. Fenton is architect for department.

Phelps-Dodge Corp., 40 Wall Street, New York, operating Phelps-Dodge Copper Products Corp., same address, has plans for expansion and improvements in copper refinery at El Paso, Tex., comprising new buildings, furnaces and other equipment. Cost over $1,500,000 with machinery. Engineering department of company is at 25 Broadway, New York.

Commanding Officer, Ordnance Department, Watervliet Arsenal, Watervliet, N. Y., asks bids until March 13 for one cast steel spider (Circular 481); until March 19, two to six gun-boring lathes (Circular 477).

Pepsi-Cola Co., North Pearl and Tivoli Streets, Albany, N. Y., plans one-story mechanical-bottling plant, with storage and distributing facilities. Cost about $50,000 with equipment. Gander & Gander, 17 Steuben Street, are architects.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until March 15 for two gear motors and control equipment (Schedule 945) for Brooklyn and Philadelphia Navy Yards; until March 12, one motor-driven bench lathe, without bench or cabinet or space parts (Schedule 926), 10 positive displacement, turbine and motor-driven rotary pumps, spare parts, special tools and wrenches; and one motor-driven diesel fuel oil service pump, with motor and controller (Schedule 914) for Philadelphia yard.

Calco Chemical Division, American Cyanamid Co., 90 West Street, New York, industrial chemicals, etc., plans two-story addition to plant at Bound Brook, N. J., for storage and distribution. Cost about $45,000 with equipment.

RCA Mfg. Co., Inc., Cooper Street, Camden, N. J., radio parts and equipment, subsidiary of Radio Corp. of America, New York, has acquired industrial plant at Bloomington, Ind., and will remodel for branch works for production of table and other model radios and parts, with assembling division.

Commanding Officer, Ordnance Department, Picatinny Arsenal, near Dover, N. J., asks bids until March 13 for one flotation tank for separation of tetryl and spent acid (Circular 1153).

Irvington Smelting & Refining Works, 374 Nye Avenue, Irvington, N. J., will take bids soon on general contract for one-story addition. Cost about $40,000 with equipment. Epple & Kahrs, 15 Washington Street, Newark, N. J., are architects.

Dodge Steel Co., State Road and Hellerman Street, Philadelphia, has let general contract to Sauter & Schwertner, 1505 Race Street, for one-story addition for expansion in foundry. Cost close to $45,000 with equipment.

Biochemical Research Foundation, Franklin Institute, 133 South Thirty-sixth Street, Philadelphia, will take bids soon on general contract for new three-story technical and research building at Newark, Del. Cost close to $165,000 with equipment. George M. Ewing, Architects' Building, Philadelphia, is architect.

Quartermaster Depot, Army Base, Fifty-eighth Street and First Avenue, Brooklyn, asks bids until March 12 for 24 compressor units, each consisting of compressor, air-cooled condenser, receiver, electric motor, shut-off valves, belts tubing, etc. (Circular 626-263).

NEW ENGLAND

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until March 12 for one gasoline engine-operated crawler-type crane and one ½-cu. yd. clam shell bucket (Schedule 893) for submarine base, New London, Conn.; two motor-driven, boring, drilling and milling machines; three boring bars, one facing head, and one rectangular hand and power feed revolving table (Schedule 916) for Boston Navy Yard; heavy-duty forging hammer (Schedule 924) for Portsmouth, N. H., yard; 474 blank steel after-body shells (Schedule 912) for Newport, R. I., naval station; until March 19, extractors for 5-in./38 caliber cartridge cases, and 6-in./47 caliber cartridge cases, for Hingham, Mass., Portsmouth, Va., Mare Island and Puget Sound yards (Schedule 909).

United States Gypsum Co., 300 West Adams Street, Chicago, building materials, will begin superstructure soon for one-story addition, 70 x 155 ft., to branch mill at Lisbon Falls, Me., for storage and distribution, for which general contract recently was let to Brown Construction Co., 562 Congress Street, Portland Me. Cost over $45,000 with equipment.

Commanding Officer, Ordnance Department, Springfield Armory, Springfield, Mass., asks bids until March 11 for gages, including adjustable snap, double and single end, taper plug, etc. (Circular 298).

Russell Mfg. Co., Middletown, Conn., brake lining and allied products, plans rebuilding two-story plant unit recently destroyed by fire. Loss over $300,000 with equipment.

OHIO AND INDIANA

Swift & Co., 4115 South Packers Avenue, Chicago, will take bids soon on general contract for new soy bean processing plant near Fostoria, Ohio, including grinding plant, bagging house, storage and distributing units, storage elevators and other structures. Cost about $250,000 with equipment.

B. F. Goodrich Co., Akron, Ohio, automobile tires and tubes, has approved plans for three-story addition, L-shaped, 80 x 130 ft., for expansion in chemical-manufacturing division. Cost about $175,000 with machinery.

Procter & Gamble Co., Gwynne Building, Cincinnati, has engaged Henry Manley, 655 Fifth Avenue, New York, engineer, to prepare plans for new soap-manufacturing plant at Dallas, Tex., and will ask bids soon on general contract. Cost close to $1,000,000 with equipment.

Empire Plow Co., 3140 East Sixty-fifth Street, Cleveland, agricultural implements and parts, has let general contract to Dean W. Rankin Co., 1836 Euclid Avenue, for one-story addition, 70 x 130 ft. Cost about $50,000 with equipment. Steffens & Fox, 1940 East Sixth Street, are architects.

Contracting Officer, Materiel Division, Air Corps, Wright Field, Dayton, Ohio, asks bids until March 11 for 42 engine overhaul stand assemblies (Circular 1135), globe valves, screwed ends (Circular 1127); until March 12, one pump and motor combination, electric portable cooling unit (Circular 1138), four heating coils, pressure-reducing valves, two ventilating system control equipments (Circular 1147); until March 13, 40 spur gear chain hoists, each 5-tons (Circular 1144), drain cocks and shut-off cocks (Circular 1146), tire valve caps, tire valve cores, valve inside cores, etc. (Schedule 1142); until March 14, 118 bench-type drill presses, 47 pedestal-type drill presses, 27 floor-type drill presses, 11 radial drills, all motor-driven (Circular 1136).

Motive Parts Co., 555 North Capitol Avenue, Indianapolis, automobile parts and equipment, has let general contract to J. L. Simmons Co., Union Title Building, for three-story addition, 30 x 110 ft. Cost close to $50,000 with equipment. Herbert Foltz & Son, Architects' and Builders' Building, are architects.

WASHINGTON DIST.

Bureau of Yards and Docks, Navy Department, Washington, asks bids (no closing date stated) for one bridge crane and four wall cranes, all motor-driven, traveling type, for Brooklyn Navy Yard (Specification 9638).

Frankfort Distilleries, Inc., Race and Ostend Streets, Baltimore, has let general contract to Consolidated Engineering Co., 20 East Franklin Street, for one-story mechanical-bottling unit. Cost close to $50,000 with equipment.

Quartermaster, Fort Myer, Va., asks bids until March 21 for gate valves, extension valve boxes, two bolted-type water main saddle sleeves with two-way gate valve, cast iron water pipe fittings, etc. (Circular 579-14).

Flynn & Emrich Co., 301 North Holliday Street, Baltimore, stokers and parts, sand mixers, etc., has asked bids on general contract for one-story addition for storage and distribution. Cost about $45,000 with equipment. W. S. Austin, Maryland Trust Building, is consulting engineer.

General Purchasing Officer, Panama Canal, Washington, asks bids until March 11 for 20,000 ft. of galvanized steel wire strand, 12 welder's helmets (Schedule 3928), 14,500 galvanized wire rope clips, 1600 galvanized wire rope thimbles, 1924 galvanized iron or steel chain shackles, galvanized steel eye bolts, turnbuckles and steel ring bolts, 450 gross sheet brass grommets, etc. (Schedule 3918), two pneumatic diamond core drills and auxiliary equipment (Schedule 3929); until March 12, six coal-burning riveting forges, 12 circular wood saws (Schedule 3919), gate, angle, globe, check, and foot valves (Schedule 3926); until March 13, 84,000 ft. of copper wire cloth, 20,000 ft. galvanized steel wire cloth, 10,000 ft. of galvanized steel wire poultry netting (Schedule 3920).

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until March 12 for one coolant unit, with pump, tank and base, and 25 coolant units, each consisting of motor-driven rotary geared pump of close-coupled type (Schedule 899) for Alexandria, Va.; one mechanical-type glue press, 1,200,000 lb. capacity, 5 x 32 ft. (Schedule 898) for Carderock, Md.; 3000 seamless steel boiler tubes (Schedule 913) for Norfolk, Va., yard; until March 15, electric heat-treating furnace (Schedule 936) for San Juan, P. R.; until March 19, motor-driven, straight-edge saw, overcutting, ripping, edging and jointing (Schedule 889) for Eastern or Western yard.

WESTERN PA. DIST.

Edwin L. Wiegand Co., 7500 Thomas Boulevard, Pittsburgh, electrical heating and other electrical equipment, has asked bids on general contract for one-story and basement addition, 87 x 108 ft. Cost about $45,000 with equipment. Prack & Prack, Martin Building, are architects.

Cementstone Corp., First National Bank Building, Pittsburgh, cast cement products, plans two one-story additions to plant on

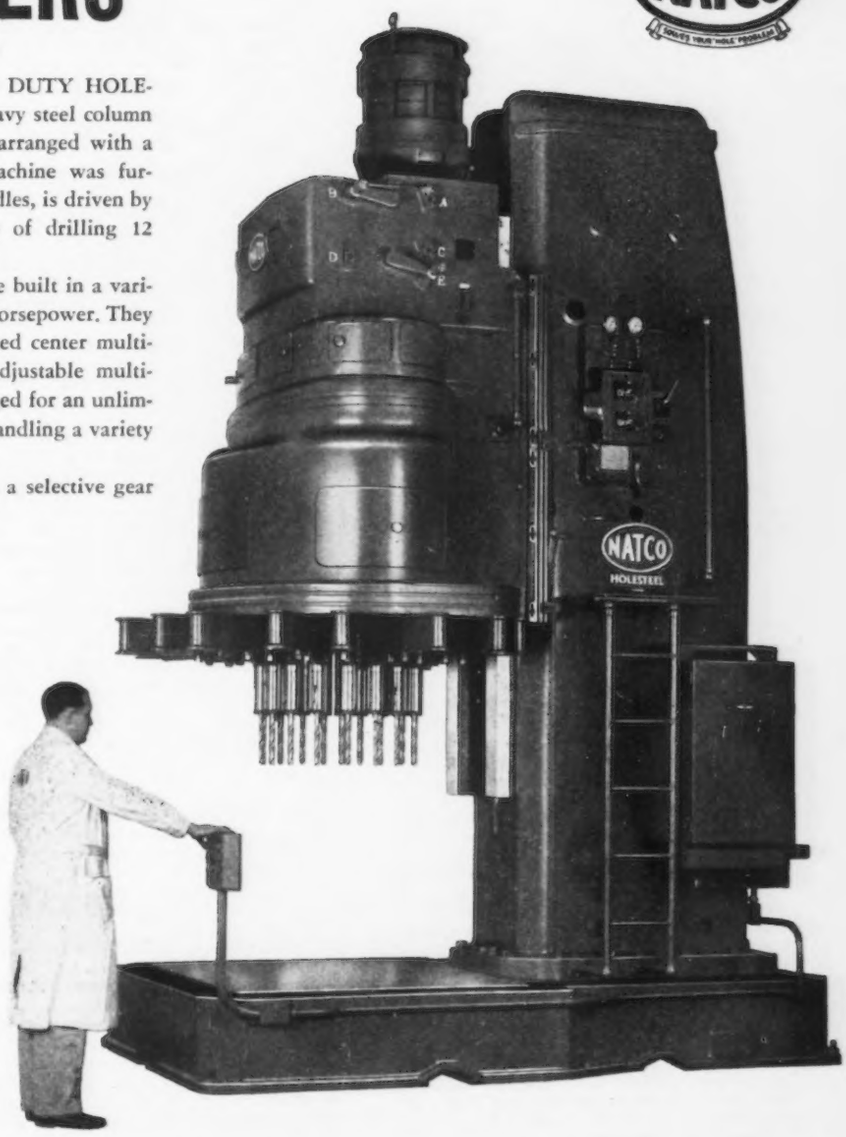
NATCO
HOLESTEEL
HEAVY DUTY ADJUSTABLE MULTI-DRILLERS

Shown at the right is a No. 5 NATCO HEAVY DUTY HOLESTEEL Adjustable Multi-Driller. It is built of a heavy steel column and base and a large adjustable joint drive head arranged with a semi-automatic hydraulic feed. This particular machine was furnished with sixteen 3 inch diameter heavy duty spindles, is driven by a 40 horsepower motor. Machine has a capacity of drilling 12 1⅜ inch diameter holes in steel at heavy feed.

NATCO HOLESTEEL Vertical Multi-Drillers are built in a variety of sizes and capacities ranging from five to fifty horsepower. They may be furnished with a single spindle head, a fixed center multi-spindle head for high production work, or an adjustable multi-spindle head as shown. Such a driller may be arranged for an unlimited number of set-ups . . . and is ideal for a shop handling a variety of work.

A variety of spindle speeds may be had through a selective gear change mechanism. This range of speeds can be further varied by the use of pick-off change gears. In addition, the adjustable multiple heads are also equipped with high and low speed spindles.

NATCO HOLESTEEL machines are of simple sturdy design and are flexible. They are easy to operate . . . and will stand hard usage over long periods with a very little maintenance expense. Write for complete descriptive literature or . . . call a NATCO representative. Let him make a study of your work. Let him help your engineers in coming to a practical solution of your "hole" problems.



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Investigate NATCO Methods for the Lowest Possible Hole Costs!

NATCO
DRILLING, BORING and TAPPING MACHINES
SOLVES YOUR "HOLE" PROBLEM

Neville Island, 100 x 100 ft., and 40 x 140 ft. Cost close to $50,000 with equipment.

Logan-Chilton Coal Co., Rite, W. Va., plans rebuilding tipple at coal-mining properties recently destroyed by fire. Loss about $50,000 with equipment.

SOUTH ATLANTIC

Big Boy Bottlers, Inc., Charlotte, N. C., has let general contract to Ernest Ford, Piedmont Building, for one-story mechanical-bottling, storage and distributing plant. Cost about $40,000 with equipment. W. H. Peeps, Latta Arcade Building, is architect.

Bureau of Yards and Docks, Navy Department, Washington, asks bids until March 13 for two hangars at naval air station, Jacksonville, Fla. (Specifications 9577).

Dayton Rubber Mfg. Co., Dayton, Ohio, mechanical rubber products, has acquired former plant of McClaren Rubber Co., 1019 West Palmer Street, Charlotte, N. C., and will remodel for branch mill.

BUFFALO DISTRICT

National Gypsum Co., 190 Delaware Avenue, Buffalo, building products, plans one-story addition to insulation fiber products mill at Mobile, Ala., 80 x 600 ft., for storage and distribution. Cost close to $175,000 with equipment. H. K. Ferguson Co., Hanna Building, Cleveland, is engineer.

Spencer Kellogg & Sons, Niagara Square, Buffalo, linseed and soy bean oils, etc., are considering expansion in soy bean processing mill at Decatur, Ill., primarily for storage and distribution, comprising about 42 additional tanks and auxiliary equipment. Cost close to $1,500,000.

MIDDLE WEST

Crane Co., 4100 South Kedzie Avenue, Chicago, has asked bids on general contract for one-story addition, for storage and distribution; also for new crane runway. Cost over $50,000 with equipment. Graham, Anderson, Probst & White, 80 East Jackson Boulevard, are architects.

Sampsel Time Control Co., Mendota, Ill., has leased one-story building, 80 x 300 ft., to be erected by Spring Valley Civic Association, Spring Valley, Ill., for new plant. Erection contract has been let to Frank A. Vesta, Lafayette, Ind. Cost over $60,000 with equipment. M. R. Beckstrom, 1518 Fifth Avenue, Moline, Ill., is architect.

Signal Corps Procurement District, 1819 West Pershing Road, Chicago, asks bids until March 27 for three motor-generator sets, relay racks, testing equipment sets, dynamotor ringing machines, condensers, coils, strip terminals, etc. (Circular 188).

Power Alcohol Co-operative Association, Victor, Iowa, W. H. Schwiebert, Victor, head, plans new plant at Ames, Iowa, for production of alcohol from corn, for use in gasoline blending, consisting of main processing unit and auxiliary structures, storage and distributing buildings, and power house. Cost close to $200,000 with machinery.

Milwaukee Coca-Cola Bottling Co., 424 East Capitol Drive, Milwaukee, has acquired property on South Main Street for new mechanical-bottling works. Cost over $60,000 with equipment. Work is scheduled to begin late in spring.

Board of Education, State House, Des Moines, Iowa, M. R. Pierson, secretary, asks bids until March 12 for power house equipment at State College, Ames, Iowa, including boiler unit and accessories, superheater, fuel-firing equipment, automatic combustion control apparatus, piping, etc.

Milwaukee-Western Fuel Co., Milwaukee, which recently merged with Pittsburgh Coal Co., with headquarters at Minneapolis, has leased 600 ft. adjoining its present property and will install new coal-handling apparatus.

R. Perlick Brass Co., Milwaukee, has increased its capitalization $100,000 to $200,000, made necessary by increased business and plant expansion. Company makes beer dispensing equipment and brewery brass goods.

Eclipse Moulded Products Co., Milwaukee, plastic manufacturer, has increased its capitalization by $50,000 for expansion. Company has purchased two-story plant at 5151 N. Thirty-second Street, and will modernize and install new machinery.

MICHIGAN DISTRICT

Holland Precision Parts Co., Holland Mich., automobile parts and equipment, has let general contract to Krieghoff Co., 6661 French Road, Detroit, for one-story addition, 200 x 360 ft. Cost over $100,000 with equipment.

Great Lakes Coca-Cola Bottling Co., 7 East Seventy-third Street, Chicago, has taken over former plant of Walcott Lathe Co., Jackson, Mich., and will modernize for new mechanical-bottling, storage and distributing plant. Company will remove executive offices to Jackson.

Chevrolet Motor Division, Flint, Mich., has let general contract to Karl B. Foster, Flint, for one-story addition, for a valve-manufacturing unit. Cost over $85,000 with equipment.

SOUTH CENTRAL

Tennessee-Eastman Corp., Kingsport, Tenn., acetate rayon products, has approved plans for one-story addition to mill, completion scheduled early in fall. Cost over $400,000 with machinery.

Read Phosphate Co., 54 Avenue N, Nashville, Tenn., plans rebuilding part of acid works at West Nashville recently destroyed by fire. Loss over $65,000 with equipment.

Director of Purchases, Tennessee Valley Authority, Knoxville, Tenn., asks bids until March 12 for one double-drum steam hoist and boiler for construction plant at Kentucky dam.

Chase Brass & Copper Co., New Orleans, has let general contract to Carl E. Woodward, Inc., Louisiana Building, for one-story factory branch, storage and distributing plant at Poydras and South Prieur Street. Two one-half ton traveling cranes and other mechanical-handling equipment will be installed. Cost about $45,000. Main offices are at Waterbury, Conn.

George A. Hormel Co., Austin, Minn., meat packer, will take bids soon on general contract for new one-story branch packing plant at Birmingham. Cost over $50,000 with equipment. Local offices are at 2327 First Avenue.

SOUTHWEST

Illinois Powder Mfg. Co., 124 North Fourth Street, St. Louis, plans new plant for production of explosives and dynamite near Spanish Fork, Utah, with power house, mechanical shops and other structures. Cost about $500,000 with equipment.

Wichita Flour Mills Co., 701 East Seventeenth Street, Wichita, Kan., plans new headhouse at local mill, with capacity of 200,000 bu. Cost close to $100,000 with mechanical-handling and other equipment. Horner & Wyatt, Board of Trade Building, Kansas City, Mo., are consulting engineers.

Carter Oil Co., Tulsa, Okla., subsidiary of Standard Oil Co. of New Jersey, plans one-story gasoline plant on North Lewis Street, including laboratory and testing unit, and mechanical shop. Cost close to $100,000 with equipment. A. M. Atkinson, Thompson Building, is architect.

United States Engineer Office, Little Rock, Ark., asks bids until March 14 for wire, locknuts, screws, pipe fittings, reflectors, vent pipes and tubes, septic tank and other equipment (Circular 84).

National Battery Co., South Fourth Street, Leavenworth, Kan., electric storage batteries and parts, has let general contract to Homer Edgell, 1531 Spruce Street, for remodeling a two-story industrial building, for manufacturing. Cost over $40,000 with equipment.

Houston Oil Field Material Co., Inc., 1524 Maury Street, Houston, Tex., oil well equipment and supplies, plans new one-story plant, 100 x 150 ft., on Wayside Drive. Cost about $50,000 with equipment. Later company plans another one and two-story unit, office and other structures at same location. Moore & Lloyd, 2503 Westheimer Street, are architects.

Consolidated Steel Corp. of Texas, Inc., Orange, Tex., plans expansion and improvements, including one-story production units and additional equipment. Cost close to $100,000 with equipment. Company is a subsidiary of Consolidated Steel Corp., Ltd., Los Angeles.

PACIFIC COAST

Public Service Brass Corp., 2901 East Slauson Avenue, Los Angeles, brass, bronze and other metal castings, plans expansion and modernization, including one-story additions to present foundry and machine shop, and extensions in storage and distributing facilities. Cost close to $50,000 with equipment. Grant & Bruner, Ferguson Building, are architects and engineers.

Bureau of Reclamation, Denver, asks bids until March 11 for two 5 x 6 ft. high-pressure gates for gate chamber of outlet works, Deer Creek dam, Provo River project, Utah (Specifications 1335-D).

Spreckels Sugar Co., 2 Pine Street, San Francisco, plans new beet sugar refinery near Rio Vista, Cal., consisting of one and multi-story processing units, with storage and distributing buildings, power house, machine shop, pumping station and other structures. Cost about $1,600,000 with machinery.

United States Engineer Office, Pittock Block, Portland, asks bids until March 19 for one 15½-ton diesel-electric gantry crane, with operating mechanism, for Fern Ridge dam (Circular 449).

Consolidated Aircraft Corp., 3302 Pacific Highway, San Diego, Cal., has let general contract to B. O. Larsen, 1340 E Street, at approximately $209,000, exclusive of equipment, for seven one-story additions, totaling about 450,000 sq. ft. of floor space, for expansion in parts, assembling, experimental and other divisions. Cost close to $1,000,000 with equipment. Edward C. and Ellis W. Taylor, 803 West Third Street, Los Angeles, are architect and engineer, respectively.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until March 12 for 14 lengths of mine-sweeping galvanized wire rope in 300-fathom lengths (Schedule 862); until March 15, two motor-driven winches and spare parts (Schedule 908), set of battery-charging equipment, with control equipment (Schedule 894), trolley-type hoist, with electric hoisting motor and electric trolley motor (Schedule 904) for Mare Island Navy Yard; until March 12 copper-nickel alloy tubing (Schedule 876); until March 19, steel melting electric furnace, and set of spare parts (Schedule 890) for Puget Sound yard; until March 15, motor-driven cylindrical, plain, self-contained grinder (Schedule 888) for San Diego Naval Air Station.

FOREIGN

General Tire & Rubber Co., Akron, Ohio, and interests at Caracas, Venezuela, headed by Dr. Alfredo M. Hernandez, are organizing company under name of Compania Anonima Nacional Manufacturera de Caucho y Neumaticos General, with headquarters at Caracas, capitalized at 1,725,000 bolivars (about $517,500), to build a new mill at Chacao, suburb of Caracas, for production of automobile tires and tubes. It will consist of several one-story buildings, with power house, machine shop and other mechanical units. Cost close to $500,000 with machinery, which will be purchased in United States. Government of Venezuela has granted concessions for mill, on which work is scheduled to begin this spring. Joseph A. Andreoli, vice-president and general manager of export company of General Tire company, will be an official of new organization. Dr. Hernandez will be president.

Cariboo Gold Quartz Mining Co., Ltd., 675 West Hastings Street, Vancouver, B. C., plans expansion in mining properties, including milling machinery and auxiliary equipment to increase ore-handling capacity. Cost over $175,000 with machinery.

SATISFIED CUSTOMERS, INC.

NOT individuals to be given service in proportion to size or pocketbooks—but one big corporation where the largest and the smallest stockholders have the same privileges and receive similar treatment. This is what R B & W means by using the term "Satisfied Customers, Inc."

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THIS WEEK'S MACHINE . . . TOOL ACTIVITIES . . .

. . . Foreign demand being sustained, with British orders predominating . . . Rockford builders allocate export business, quoting up to end of 1941 on delivery . . . Domestic deliveries six to eight months on the average . . . Automotive changeovers presage large tool and die program.

Rockford Plants Allocate Foreign Business

CHICAGO—A survey of Rockford machine tool plants last week revealed an almost unanimous desire on the part of the builders to reduce the proportion of foreign business going through their respective shops. At present, export orders account for from 10 to 50 per cent of total bookings, the average being slightly more than 30 per cent. In all plants export production allocations are being rigidly adhered to, though there is much foreign business available for the taking. The tendency toward early elimination of Russian business and a reluctance to contract for more seems fairly general. Some shops are filling their export allotment with French and British orders. Several plants have foreign business scheduled into 1941, but in almost no case is domestic production so far advanced. Domestic buyers are being quoted from August to December, 1940, however, depending on the type of machine purchased. In spite of these lengthy deliveries, domestic orders continue to come in at a good rate, the builders reported, and in some cases February new business equaled that of January.

At one plant, where up to 40 per cent of each month's bookings are for export, only 20 per cent of this business is scheduled for production each month, affording domestic buyers that much of an improvement in deliveries. This same plant, with 60 per cent domestic business, is selling 30 per cent to the Government, mostly for delivery to various Navy yards. A builder, seeking to obtain cancellation of a Japanese inquiry for a $25,000 machine, quoted December, 1941, delivery, 50 per cent cash in advance—to his surprise, his quotation was accepted and a letter of credit for the required amount accompanied the order.

Meanwhile in Chicago proper, February business ranged from somewhat less than January to considerably better. Miscellaneous buying of individual machines continues to feature this market. Last week, the Illinois Central bought the last of 11 machine tools from an old list. The Milwaukee road's list of some 25 machines is still pending.

Foreign and Domestic Sales Maintain Same Relation

CINCINNATI—No change in the machinery demand in the southern Ohio district was noted during the past week. The slight increase of the previous week has been sustained with the same relative proportions of demand from domestic and foreign sources. Builders report that there has been a number of substantial orders originating in the export trade and that domestic business, although largely of single unit size, continues to follow the pattern that has been maintained throughout this quarter. England seems to predominate in the foreign demand, although some business from France, Russia and Japan is reported. Lathes, millers and grinders continue to lead the market in bookings, although other types of tools are receiving a fair amount of consumer interest. Tool users continue to press for as early delivery as is possible, but shipments of a shorter period than six months are all but absent under present conditions and eight months to a year is more general.

Operations continue at full capacity.

Big Tool and Die Program Expected in Detroit

DETROIT—A volume of tool and die work unexceeded in any previous year in the automobile industry is indicated by current inquiries and the revelations of plans for thorough-going body changes in the entire General Motors line. Added to these are extensive plans on the part of other manufacturers for revising model lines and the indication that Ford, Nash and Hudson will require dies for entirely new lines of cars. Machine tool activity is assuming a broader base with automotive and aircraft vying for first place. However, general industrial requirements are of such important proportions as to be surprising in many instances. One illustration is the recent placing of an order for nearly 100 machines to weave wire screening of a new type designed to simulate miniature Venetian blinds.

Press Sales Helped By Automotive Programs

CLEVELAND—March has started off slowly in this district from the standpoint of inquiries, but sellers and producers confidently expect it will prove to be a normal month. February turned out better than expected, even excluding from consideration the heavy buying by one aircraft parts producer.

A down-state press manufacturer is understood to have been in the market for radials and a planer. Several jig borers have been sold for spring delivery. The Akron rubber companies have been active on small items. February sales of press manufacturers were around 50 per cent over January and the best of any month since September. This showing of press sellers is largely due to the activity of the automotive industry, which is buying for 1941 models at a much better rate than was the case for 1940 models.

A newly developed fuel system for military planes, which stabilizes fuel pressure at high altitudes, through eliminating vapor lock, is being manufactured by Pump Engineering Service Corp.

Considerable interest centers on airplane requirements of the Allies.

Mixed Sales Trends Seen in the East

NEW YORK—While some dealers report that the sales pace has materially slackened in the last week or two, others report a fairly satisfactory volume, coming from general sources. Firms with Government contracts and aircraft parts makers continue to figure in the market, although the large programs on the part of the principal aircraft engine builders have not yet been launched. Altogether February was a fair month and the outlook for this month is excellent.

The New York Central has inquired for some machine tools for the first time in a year.

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160 Take Shop Training To Meet Aircraft Demand

CLEVELAND—One hundred and sixty men are enrolled in a course of shop training designed to provide skilled labor quickly to meet demands of the unprecedented expansion of the aircraft parts industry here.

Instead of the usual year and a half generally considered necessary for training, Thompson Products, Inc., manufacturer of valves, has adopted an intensive training course which is separate from its regular, formal apprentice training program. Seventy-five additional men will be enrolled in the course soon. Fifty men have been trained already. Twenty-seven thread grinders were turned out recently in a remarkably short time made necessary by an emergency.

The purpose is not to make all-round mechanics but to train expert grinders, screw machine operators, automatic set-up men, thread grinders, hammer men, or inspectors—to train qualified specialists for necessary skilled operations. It is estimated that the average length of time for training will be three months.